# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXX. No. 1797.] LONDON, OCTOBER 19, 1897. [49TH YEAR. PRICE 6d.



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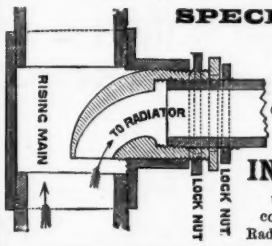


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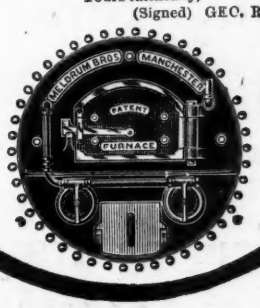


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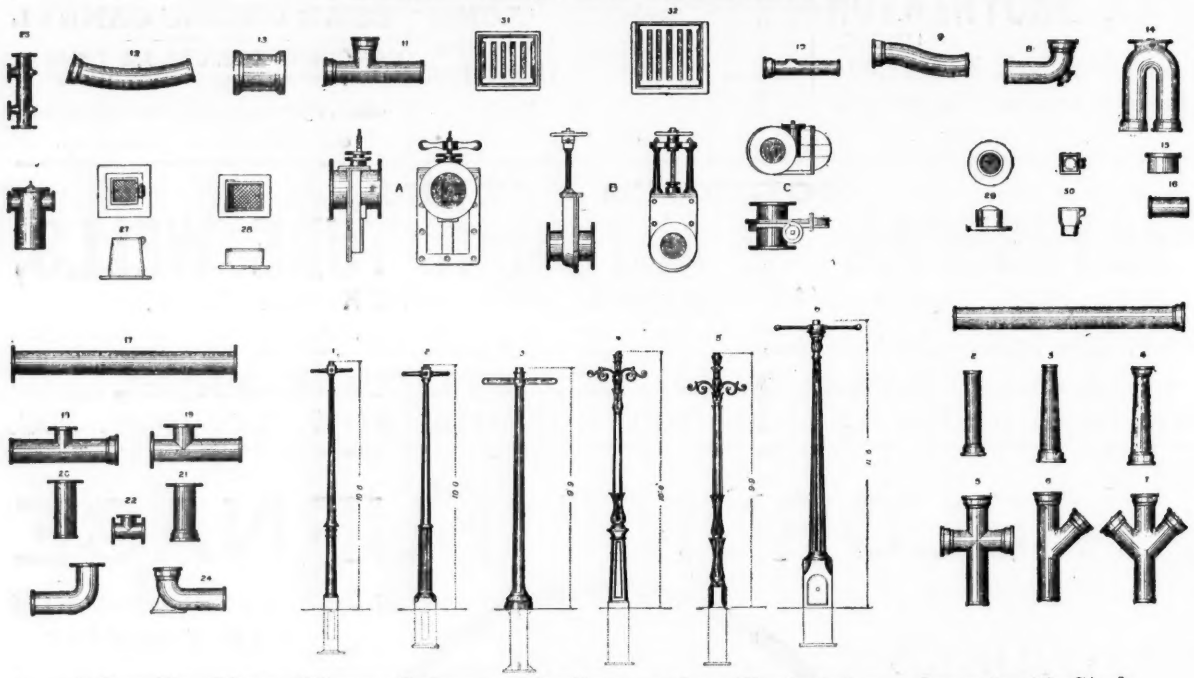

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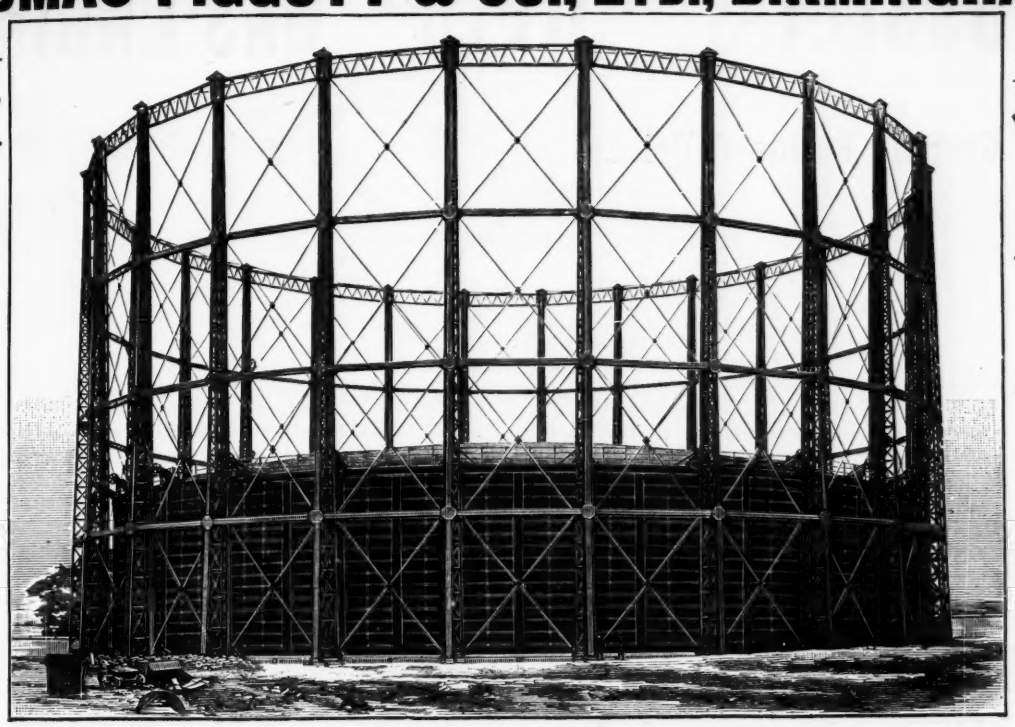

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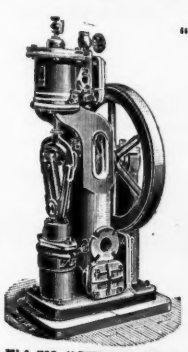

Fig. 705. "SINGLE RAM" STEAM-PUMP.

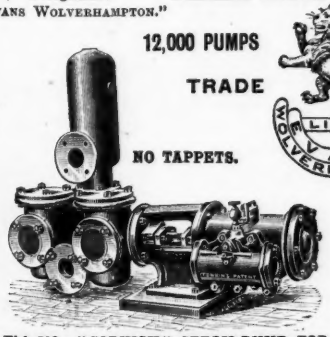

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

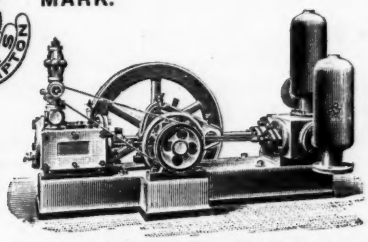

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

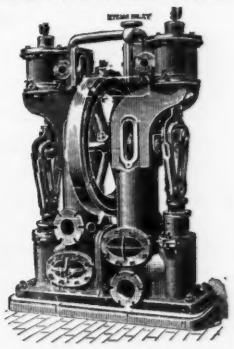

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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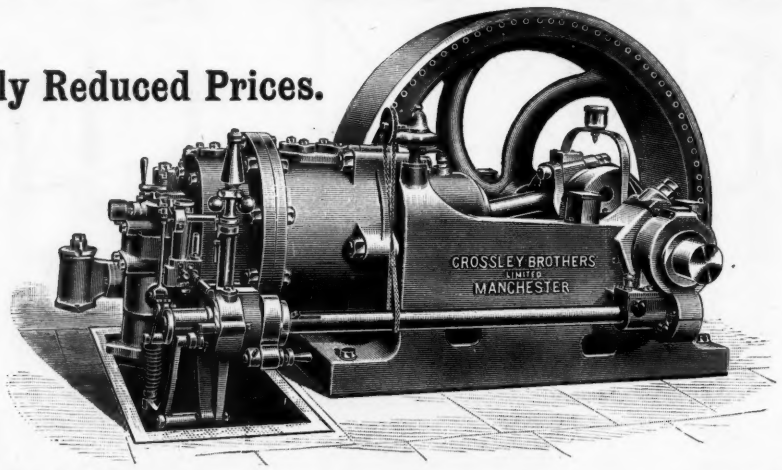


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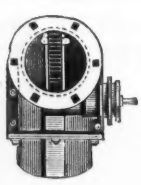

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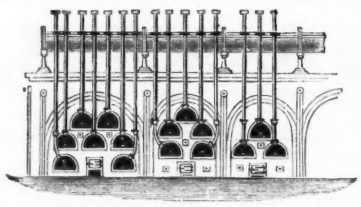

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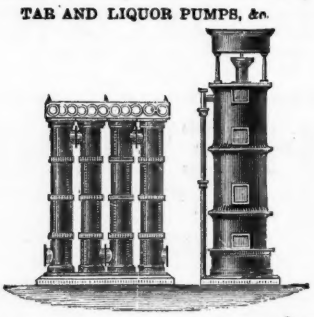

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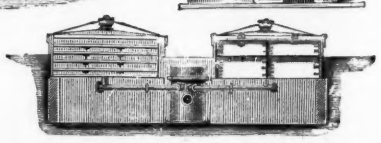

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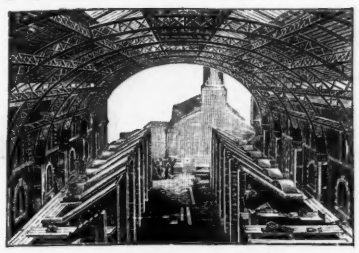

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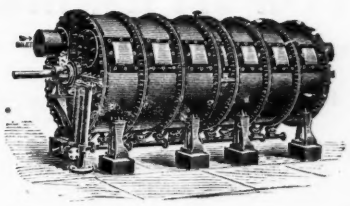

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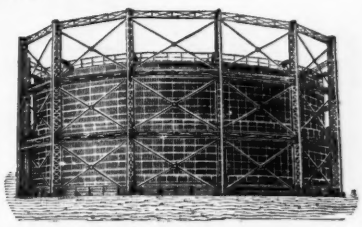

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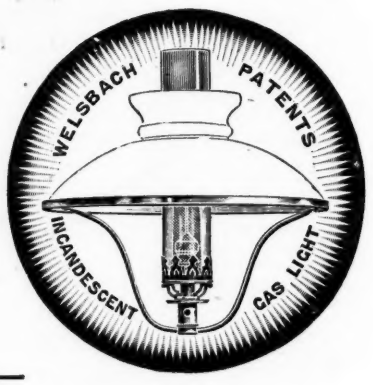


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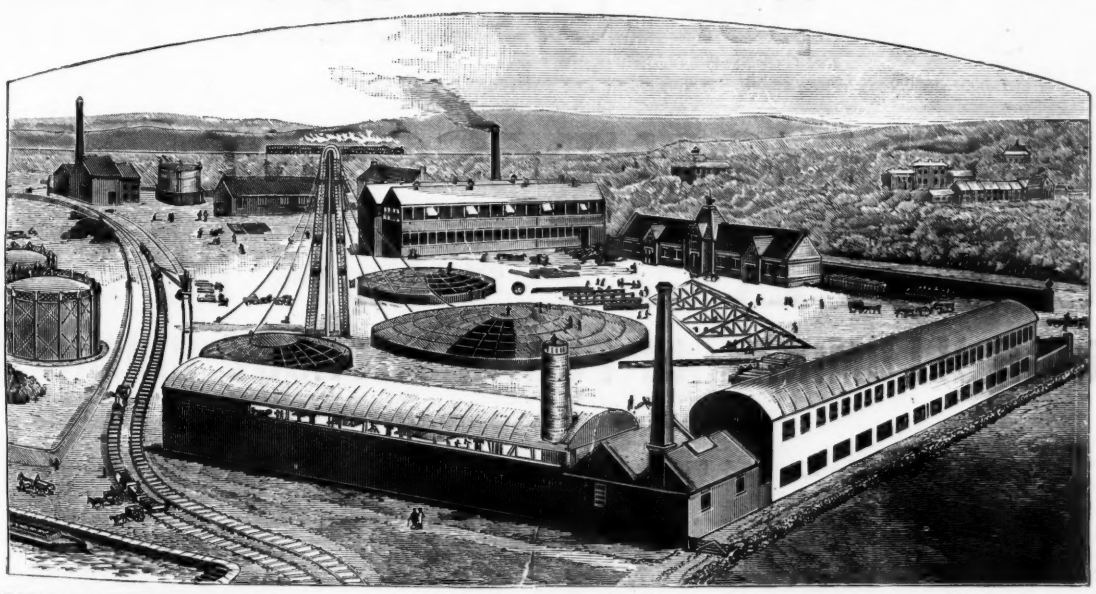

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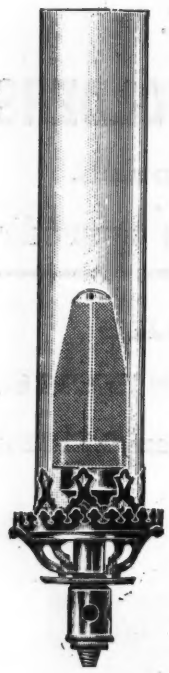

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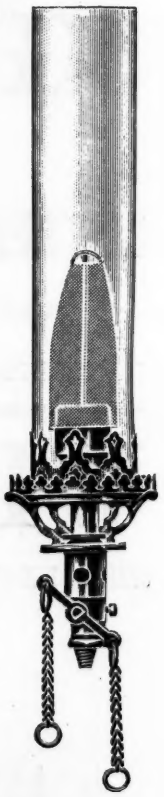

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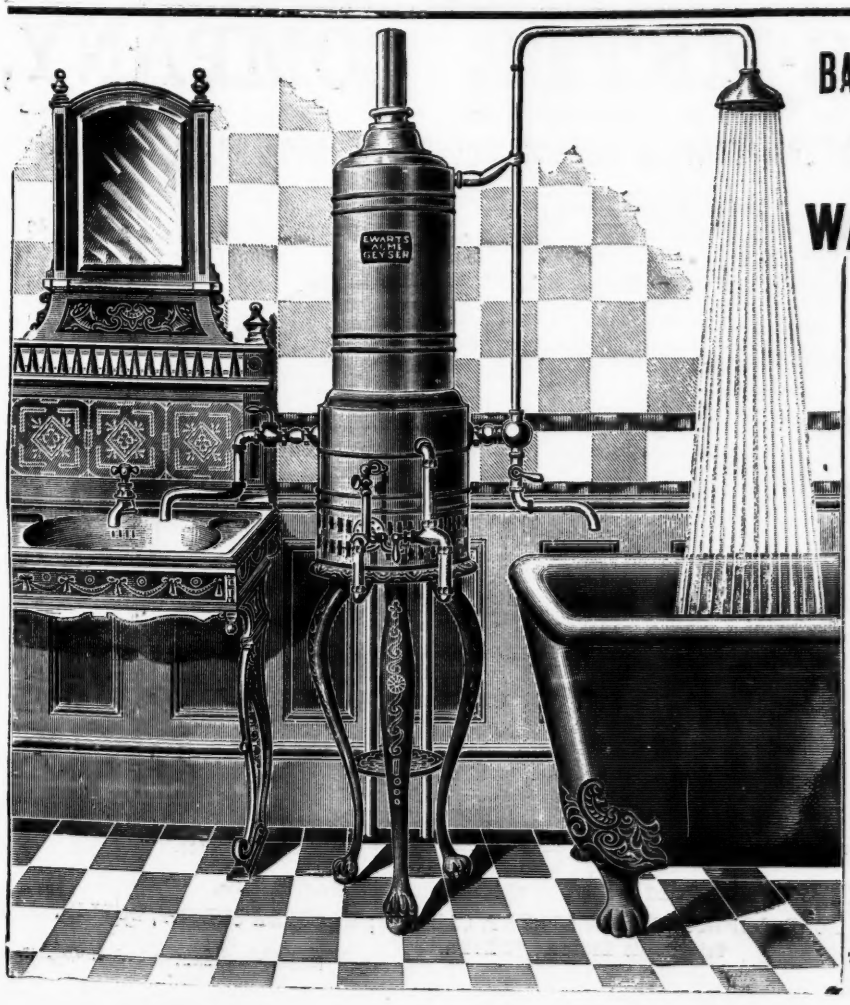


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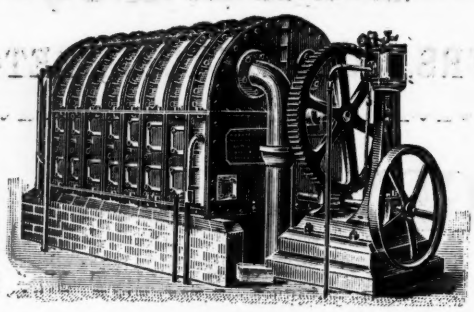

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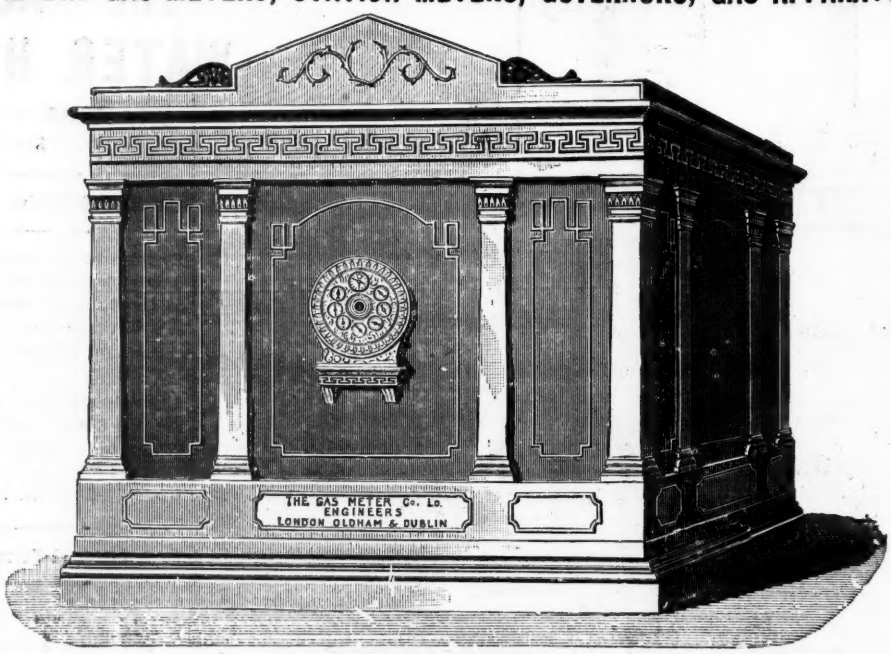


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| New York | 1,200,000 | Bridlington | 125,000 |
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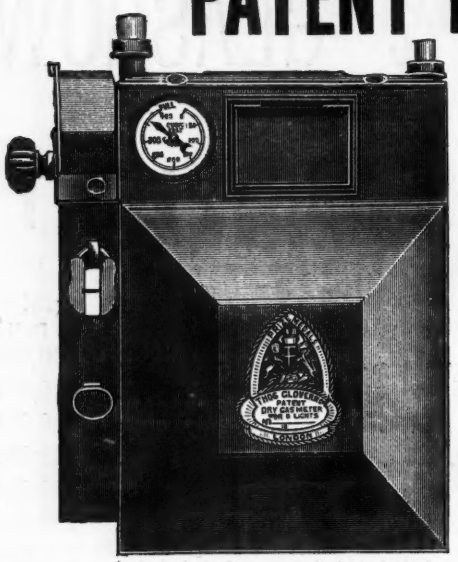

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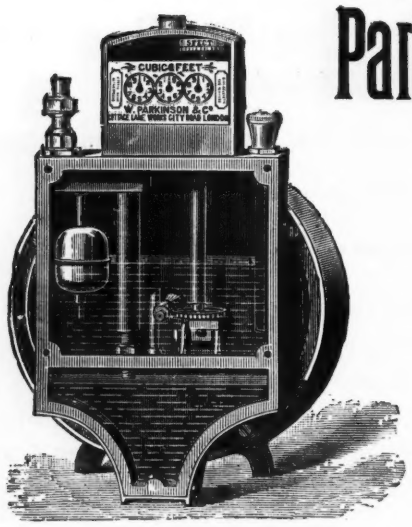


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[See also Advt. p. 876.

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## TO CORRESPONDENTS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.*

## EDITORIAL NOTES.

### The Scope of the Workmen's Compensation Act.

THE inquiry of Mr. Robert Hall, of Matlock, as to the scope of the Workmen's Compensation Act, which appeared in our "Correspondence" column last week, has elicited from Mr. H. D. Ellis, the Secretary of the Commercial Gas Company, the entirely satisfactory reply which will be found in the same column of the present issue. Mr. Hall wanted to know how, if at all, this Act applies to gas-works; and he gave it as his opinion that it does not so apply. Mr. Ellis very properly replies that it is all a question of whether or not a gas-works is a "factory." Gas-works, as a class of undertaking, are not specifically included within the scope of operation of the Act. And so far Mr. Hall's suspicions are justified. It is, however, all a question of degree. So soon as the manufacture of gas becomes an operation of such magnitude as to require the use of machinery, the works become a factory within the meaning of the Factory and Workshop Act, 1878; and the Workmen's Compensation Act applies to all such. Mr. Hall's question was well worth putting, because it went to show that there was something about the scope of the new law that needed clearing up. It is astonishing how often, for the want of such an inquiry at the proper time, conventional notions and beliefs respecting law and other human affairs grow and take root, only to give trouble at a later time. Mr. Hall was slightly in error in supposing, as he did, that before his inquiry there was no mention in the "JOURNAL" as to whether or not the Workmen's Compensation Act applies to gas-works. He has quite overlooked the historic fact that it was the intelligence of the manner in which the prospect of this legislative change was received in the South Metropolitan Gas-Works that really gave the last fillip to the Government case for the Bill. It must be allowed, however, that Mr. Hall represents a numerous order of gas-works administrators to whom the practice of gas making bears an aspect different from that which it presents in large centres of the industry. The case is on all-fours with that of shoe making. It would not be reasonable to include the making of boots and shoes as an industry among those to which a Workmen's Compensation Act applies. Here again it is all a question of degree—of the character of the industrial establishment, and not of the work that may be carried on in it. On the other hand, there are certain industrial operations which cannot be judged, for the purposes of the Act, by mere extent or commercial importance. A railway is an example in point; and so is a mine. It should be remembered that the plea for the extension of the Act so as to include "workshops" was strenuously resisted, for ample reasons. It is not very difficult, in the light of much experience, to decide when a place is a factory; but to say what is a workshop and what is not, is another matter. In short, a factory is a workshop; but a workshop need not be a factory. If a gas-works is also a factory, the Workmen's Compensation Act applies to it; but not otherwise. This is consolatory to the makers of coal or other gases in the small way.

### Proceedings under the Gas and Water Works Facilities Act, 1870.

THE report by the Board of Trade of their proceedings under the Gas and Water Works Facilities Act, 1870, during the past session has been issued; and the leading particulars will be found in another column. Eight applications relating to gas undertakings were dealt with by the Department; the total share capital involved amounting to £232,500, with £58,875 of loan capital. Quite a respectable amount of business this, though the number of applications was not great. The course of this facilitated gas legislation did not run quite smooth, inasmuch as objections were lodged against most of the applications. Opposition resulted in a local inquiry in only one case, however; the others being settled by discussions and some meetings between the parties at the Board of Trade. The single troublesome case was that of the Wimborne Minster Gas Company, which was investigated by Lieut.-Col. H. A. Yorke, who eventually advised the Board to grant the Order without the consent of the local authorities. The sliding-scale was adopted in the Cradley Heath and Wimborne Minster Orders; and maximum prices were imposed in four other cases, with reservation of power to the Board

of Trade to vary the maximum price or substitute a sliding-scale after three years. In one Order, the illuminating power of the gas to be supplied was fixed at 16 candles; but in the others, the usual minimum of 15 candles was adhered to. All these Gas Orders were included in two Confirmation Acts.

### Misunderstanding a Notification.

A CURIOUS example of the proneness of the public to misunderstand tax or rate papers, demand-notes, and similar official communications, is furnished by a recent issue of "The Times," in the shape of a complaint from a correspondent signing himself "Idiotes" concerning his latest gas bill. It was announced at the last general meeting of The Gaslight and Coke Company that henceforward the quarterly account-forms issued by the Company to their consumers would show how much of the charge for gas was collected for local rates. The idea is not a new one, inasmuch as certain local authorities have long been in the habit of drawing attention, in their rate demand-notes, to the proportion of the rate which they merely collect for independent spending bodies, such as the School Board. However, the Company have carried out their intention, and the consumers are now notified that the Chartered Company's gas bears a burden of 2½d. per 1000 cubic feet for rates levied by the local authorities, "over whose expenditure the Directors have no control." This seems plain enough. But one consumer seems to have taken the notification almost as a personal affront. He remarks magnanimously that he has no feeling whatever against the Company, and has always been most courteously treated by their officers. He goes further, and admits that the readiness of the Company "to supply excellent cooking-stoves at a reasonable charge is very much appreciated by small householders groaning under the wayward behaviour of that coal-devouring monster—the 'kitchen range.'" But here comes the remarkable conclusion: "Cheerful payment of a Company's bill for the punctual supply of a good article is one thing; paying its parish rates for it is quite another." Thus the scheme of the Directors for making the consumers acquainted with the fact that the ordinary price of gas contains and covers a charge for rates, has lamentably failed in one case, at all events, and probably is not singular, since it has struck the authorities of "The Times" as sufficiently well based to merit publicity. If the consumer had taken the trouble to see whether the price charged for his gas was an increased one or not, it would perhaps have dawned upon him that the statement in question was not open to the interpretation he hastily attached to it. The incident is instructive enough as it stands, and does not call for detailed comment.

### The Recrudescence of Bimetallism.

DURING the last few weeks newspaper readers have been obfuscated by a forced revival of the bimetallic controversy, which few people can truthfully claim to understand, while most of us secretly hope that we may never be asked to give a statement of our views on the matter. It is a little hard upon the "man in the street" to ask him to consider the position of "silver" in the United States, with some slight regard to the case of India, and a little thought for the circumstances of France and China. There is now a feeling abroad that "silver" men are not quite respectable, and the comparatively recent defeat of Bryan in his candidature for the Presidency of the United States seemed to settle the question of "silver"—whatever it might be—for a generation. Yet here it is again, more portentous than ever, inasmuch as the "gold" President of the United States has accredited to this country a Commission supposed to be charged with the delicate task of opening up the subject of the international remonetization of silver; and the Governor of the Bank of England has addressed a letter to the Chancellor of the Exchequer offering under certain conditions to hold part of the Bank's reserve in silver. In the circumstances, it is only natural that what is commonly called the "City" of London—meaning the financial capital of the world—should deem it expedient to place before the Government the case for maintaining "the monetary position of the country, the credit of the bank note, and the solvency of banking institutions." Accordingly, last Saturday's newspapers contained the text of a remarkable memorial addressed to the Chancellor of the Exchequer by a large majority of the leading banks and mercantile and financial firms of the City protesting against any interference with the metallic currency of this country. It can scarcely be supposed that the Government can have in contemplation the idea of tampering with the pound sterling upon representations originating in the United States or anywhere else. Still, there is a portentous amount of clamour upon and about the mutual value and relationship of gold and silver, which does not tend to convince the plain man that those who pose as authorities upon economics and finance are quite sure of their ground, on either side. The "JOURNAL," of course, is no authority upon these questions of "high finance;" but we have a crude idea that a measure of value, like measures of length or quantity, must be a constant and non-fluctuating unit. The consensus of civilized opinion has decided that gold is the best basis upon which the universal standard of value should be erected; and why silver has anything more to do with this standard than tin, or nickel, or leather, passes our poor comprehension. Happily this notion is supported by the best financial judgment of London. In this connection it is consoling to note that the Chartered Banks of Canada have reiterated their conviction "that a double standard of value obligation is delusive and impracticable." It is to be feared that those who do not see this to be true at a glance, can hardly be persuaded of its truth by argument.

### Abridgments of Patent Specifications.

IT is extremely gratifying to be able to say a good word for the British Patent Office. We have never joined in the ill-informed clamour of would-be patent law reformers which exalts American or Continental patent systems to the prejudice of our own. But Government departments are the better for watching and criticism; and we have never pretended that our Patent Office was perfect. It has vastly improved of late years, however; and it is now our pleasant duty to acknowledge a great service newly done by the Comptroller-General for those who use the office. A circular has been sent us with a specimen of the new series of "Abridgments of Specifications" relating to Gas Manufacture; and we gladly support the official endeavour to make the technical public acquainted with the character and value of these handy publications. The present volume covers the period 1884-88; and it is to be followed shortly by similar series for the periods 1889-92 and 1893-96. Everybody who has had occasion to search the Patent Office records knows the value of the old abridgments; and the only grievance has been that the series terminated abruptly, and for a long time was not resumed. The new series is an improvement upon the old, in being illustrated. Of course, the utility of publications of this kind largely depends upon the degree of intelligence with which the matter is prepared and used. The former is a matter for the Comptroller-General; and we are quite willing to concede that the work is done as well as possible. With regard to the latter, a few words of caution and counsel may not be out of place.

In the statement of the object of the abridgments, issued with the official circular, it is explained that the patent laws of this country do not make provision for an official search as regards novelty; and all patents are taken out at the risk of the inventors. It is really the same everywhere; but our system puts the fact more prominently forward than some others. The task of searching for anticipations, therefore, is left by the British Patent Office to intending patentees, who can only neglect it at their peril. The Comptroller-General recognizes that a complete and exhaustive search through published specifications of patents is a task of considerable difficulty—even for the trained expert, with all the resources of the Patent Office Library; for at this moment the number of printed specifications is well over a quarter of a million. The published indexes and abridgments are intended as a guide to the specifications themselves. "The abridgments give a general description of the nature of every invention patented; and the object of their publication is to enable the would-be patentee to carry out, at any rate in some cases, what may be termed a fireside search. By the study of these abridgments, he will generally be able to select certain inventions which have already been patented, and which resemble his own invention sufficiently to render it desirable for him to examine their specifications in detail." This plain, homely language is very refreshing in an official statement. In the present case, it is particularly appropriate in giving the inventor, who is not always or necessarily an expert in the matter

which he has in mind, an idea of what he has to do to steer clear of those troublesome anticipations which are the patentee's bane. He is very properly warned not to expect too much of the abridgments—a very essential caution, when it is remembered that in the necessary process of condensation whole pages of letterpress description and sheets of drawings have to be represented by a few lines and a single figure respectively. We congratulate the department upon the progress that is being made in the good work of constituting the Patent Office an agency for assisting the technical education of the British public.

**The Trouble in the Engineering Trade.**

THE strike news of the week contains several interesting features. The Executive of the Amalgamated Society of Engineers issued a fervent appeal to the general public for financial help, which does not look as if the Union funds were equal to the strain put upon them in the cause of militant Socialism. So far, the public have not displayed any marked enthusiasm in replenishing the coffers of the A.S.E. A few contributions from other Unions have come in; but the amount is trifling in comparison with that of the weekly strike pay. On Monday of last week, "The Times" published a letter from a correspondent who had on a previous occasion alleged that the A.S.E. was "insolvent to the extent of a more than a "million-and-a-half sterling; that a levy of £19 17s. per "member was necessary to make it solvent; and that its "insolvency had been incurred by an unfair application "of the subscriptions paid by its members, to secure "their superannuation benefit, to the purposes of strike "expenditure." In default of a satisfactory reply to these charges, the writer now declares that "the insol-"vency of the Amalgamated Society of Engineers as a "benefit society is too clearly established to admit of "disproof." It is hinted that the officials of the Society are quite aware of the rottenness of their finances, and that they are deliberately courting disaster on the battlefield rather than wait for the prosaic and commonplace *dénouement* of insolvency. In other words, it is not the masters who want to "smash the Union," but Messrs. Barnes and Company, of the official ring, who are bent upon concealing the natural results of their past policy in the general collapse that cannot be long deferred.

During the week appeals for intervention were addressed to various notables, from the Archbishop of Canterbury and the Prince of Wales downwards in the social scale; but these tentatives only proved abortive. A remarkable development of the situation originated early in the week at Carlisle, where a meeting of the Executive Council of the Engineering and Shipbuilding Federated Trades took place under the presidency of Mr. Knight, the redoubtable General Secretary of the Boilermakers' Society. The proceedings were conducted in private; the only result permitted to transpire being that a deputation had been appointed to approach the Board of Trade to ask Mr. Ritchie to meet the Council for the purpose of discussing the present industrial position. Inasmuch as this decision did not support the action of the A.S.E., Mr. Barnes lost no time in confiding to his Press friends his opinion that it was "wholly unsatisfactory." Meanwhile the action of the Boilermakers in regard to the declared intention of the London Ship Repairers' Association to revert to the nine-hour day had been left in suspense. Interviews between the parties took place and meetings were held, which eventuated in the acceptance by Mr. Knight of terms of settlement applying to the boilermakers alone. This severance between the Boilermakers and the Iron Shipbuilders was of a piece with Mr. Knight's reputation for looking after his own Union first. When the employers' notices expired on Friday, however, a considerable number of boilermakers came out with the men of the other trades with whom they had been associated in the ship-repairing yards. This was a tactical triumph for the engineers and the other strikers; but Mr. Knight and the Boilermakers' Executive, upon being informed of the men's action, very promptly repudiated it, and told the rebels they would get no strike-pay from the Society. As the A.S.E. can hardly accept with equanimity the responsibility of finding strike-pay for the rebellious boilermakers, the probability is that the insurrection will now quickly subside. The spectacle of Mr. Knight once more succeeding in getting something from the employers of members of his Union, and keeping his men in work, must indeed be "wholly unsatisfactory" to the Engineers' Executive.

## WATER AND SANITARY AFFAIRS.

THERE is to be yet another inquiry into the water supply of London; and this time by the London County Council. We are tolerably certain what the result will be, though an attempt to prevent the inquiry on the part of the Moderates would have been misconstrued, and it would have been said that the Water Companies feared investigation. Had the County Council resolved on calling in some independent experts to deal with the question, the confidence of Mr. Boulnois as to the issue would be perfectly warranted. Under present circumstances, we have no such confidence. The inquiry is remitted to the Public Health and Water Committees of the Council, who will forthwith go to work to discover the thirty-five overflows of raw sewage which according to Mr. Ward pass into the river in times of flood. We shall have an enumeration of all the population above the intakes, and a calculation as to the number of horses, cattle, sheep, and pigs located on the banks of the Upper Thames. Dr. Forman has not the slightest doubt that the people of London are drinking sewage; and the marvel is that they are so inconsistently healthy. We can only suppose that the forthcoming inquiry is simply inevitable. It is the way of the County Council. They could do no less, with such a splendid chance of a scare as that now presented by the Maidstone epidemic. If when they have reckoned up all the kinds of pollution supposed to beset the Thames—the town drains, the agricultural manure, the sewage farms, the horses, cows, pigs, and people—they will forthwith bring pressure to bear on the Conservators of the Thames, so that any possible sources of pollution may be properly dealt with, some good may be done. But we dare not venture to hope for so much. In the judgment of the County Council there is but one remedy, and that is to make reservoirs in Wales, with aqueducts to London—all this to be the Council's property. As for cutting off sources of pollution that are supposed to affect the Thames, Mr. Idris brought a most serious charge against certain parties. He said that it was difficult to get the Rivers Purification Committee of the Conservancy to take action, because the Committee consisted largely of members who were interested in land in the Thames Valley, and who thought it unjust that they should be compelled to pay for the purification of the effluents in order to provide drinking water for London. But who has a right to foul the stream; and what are the authorities worth who look calmly on while this is being done? We do not believe that the pollution exists to anything like the extent talked about; but those who think it does are not the people who ought to connive at it.

The real source of the London Water Supply is to be found at the intakes of the works. There, no pathogenic germ has ever been discovered. Afterwards, resting in the subsidence reservoirs, the water gets rid of a large proportion of the bacteria; and the filter-beds subsequently arrest more than 99 per cent. of those that were originally taken in. Nobody who drinks the water as supplied to the consumer is injured by it, or, on the other hand, is likely to be at all benefited by the coming investigation to be conducted by the London County Council. If the two Committees who are to go hunting after rivulets of sewage will sit down and read what the annual report of the Local Government Board says about the London Water Supply, they can learn more concerning it than they are likely to gather in their forthcoming excursion up the stream. Or, if they choose, they may give a careful perusal to the leading article in "The "Times" of last Tuesday, where the Maidstone tragedy is described as well calculated to render Londoners grateful that their interests in respect to the water supply are neither left entirely in the hands of purveyors, "nor exposed to the risks which might be attendant upon "administration by a County Council with political lean-"ings towards the votes of working men." The public are once more reminded that the "water famine" which afflicted East London during a summer's drought was due to the intervention of the County Council which prevented the passing of the Company's Bill in 1893.

"The Times" refers to General Scott as showing the adequacy of the present sources for the supply of the entire Metropolis; while Sir Edward Frankland is cited as guaranteeing the quality of the water. So far as investigation and supervision go, the work is already quite complete; but the County Council have a desire—as

"The Times" expresses it—"to be converted into the "Metropolitan Water Authority." Hence the present movement, which we can only look upon as one more attempt to discredit the existing water supply of the Metropolis. The Council have done nothing as yet to improve that supply, but everything to hinder and cripple it. By so doing they have put themselves out of court, and have given proof of their utter unfitness to have anything to do with the water supply of London. The vote of last Tuesday, by which they are allowed to meddle with the subject, simply shows by its unanimity that the Companies have no desire for any real fact to be concealed. The great difficulty is to get the Council to recognize such facts as carry weight with men like Sir Edward Frankland and General Scott, together with other authorities of eminence. London must now await the verdict of the two Committees, and discard all reference to Lord Balfour's Commission.

**"Meters, Limited."**—In another part of the "JOURNAL" will be found the prospectus of a Company registered under the above title, with a capital of £350,000, divided into 150,000 5½ per cent. cumulative preference shares, and 200,000 ordinary shares, of £1 each, with the object of amalgamating the businesses of Messrs. J. and J. Braddock, Messrs. G. Orme and Co., Messrs. Sawer and Purves, and the Automatic Gas-Meter (1895) Corporation, Limited, and acquiring all the patents appertaining thereto, as well as Brownhill's original patent for automatic prepayment gas-meters and those granted for improvements thereon. It will be seen that among the Directors are Mr. G. H. Braddock and Mr. F. H. Orme, of Oldham, Alderman Miles, J.P., Chairman of the Bolton Corporation Gas Committee, Alderman Jackson, Chairman of the Todmorden Corporation Gas Committee, and Mr. H. J. Davis, a Director of the Davis Gas-Stove Company, Limited. The Board in its entirety is a strong one; the other members having been long acquainted with the gas industry. The Directors are advised that the above-named combination of patents "gives them prior rights in prepayment or penny-in-the-slot meters in this country;" and that "they hold the original patent for automatic prepayment meters." In addition to the share capital, there will be an issue of £150,000 of 4½ per cent. first mortgage debenture stock. The subscription list opens to-day, and will close on or before Thursday.

**Photometry at the German Imperial Physical-Technical Institute.**—The report on the photometric tests carried out at the Reichsanstalt at Charlottenburg in 1896 contains some interesting information. The recommendations of the International Electrotechnical Conference held at Geneva last year (see "JOURNAL," Vol. LXVIII., p. 406) have given an impetus to the adoption of the Hefner-Alteneck unit of light, and no fewer than 74 of these lamps were tested at the Institute during the year. Of these, 51 were fitted with Krüss's optical flame-measurer, and the remainder with the old sight. A sample of amyl-acetate which had been exposed in a corked bottle to the influence of sun and cold since June, 1891, was used in a Hefner lamp in January last, and furnished too low an illuminating power by about 4·3 per cent. The liquid had acquired a most unpleasant smell and a strongly acid reaction. Another sample which had stood under similar conditions since February, 1893, was but feebly acid, and only gave 0·7 per cent. too low an illuminating power. Among other tests, the Institute examined 330 glow and 6 arc electric lamps, 108 incandescent gas-mantles, and 3 burners, 14 gas-burners of other descriptions, and a number of petroleum lamps and burners. Tests are now being made with a view to elaborating a simple method of measuring accurately the mean spherical intensity of electric glow lamps.

**The Gas-Traction Tramway at Blackpool.**—It may be remembered that in the notice which appeared in the "JOURNAL" for July 14 last year of the successful opening of the gas-traction tramway at Blackpool, it was mentioned that only one section of the line—that between Blackpool and St. Anne's-on-the-Sea—had been finished; the progress of the second portion ending at Lytham, having been unavoidably delayed. The work has now been completed; and it was inspected last Wednesday by Major Marindin on behalf of the Board of Trade. The car used was capable of holding 52 passengers, and was one of a dozen similar in design which are being built in Lancaster. It was drawn by a 15-horse power engine, which was, of course, capable of driving much faster than the regulation speed of eight miles an hour sanctioned by the Board. The inspection was attended by representatives of the Gas Traction Company, Limited, who are exploiting the system, and of the local authorities; and everything passed off well. Considerable interest has been manifested in this pioneer experiment in the application of gas traction for tramways in this country; and the unqualified success which has attended the working of the section of the line brought into use last year augurs well for the satisfactory working of the complete scheme. It is proposed to have a half-hourly service through the winter; but the cars will run at seven-minute intervals in the summer. The line is about 7½ miles long.

# ESSAYS, COMMENTARIES, AND REVIEWS.

## GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 857.)

BUSINESS in general on the Stock Exchange was decidedly quiet last week. The fact of its being account week was an impediment to fresh business; but there was no difficulty at all about the settlement. Then the uncertainty as to what action the Bank of England might take on Thursday was a check, though things seemed all the firmer when the position was known and anxiety relieved, despite the actual advance in money. Indeed, Consols and other choice articles closed a good bit better than they opened. The increase in the Bank rate on Thursday to 3 per cent. (from the rate of 2½, which had only lasted three weeks) had been to a considerable extent anticipated. Whether it will last long itself, is a very open question. Business in Gas showed a good advance in point of activity. Several fairly considerable improvements were made in quotations; while *per contra* nothing slipped back. In Gaslights, the "A" was, every day, remarkably active at the most level figures possible—never varying outside 316-17½. Dealings took place to an unusual extent in most of the secured issues, all of which were firm; but the only issue which actually rose in price was the "K" 6 per cents. Good average business was done pretty well every day in South Metropolitan, which stood very firm at the old figures ruling for some weeks past. There were a few deals in Commercials; but none after the *ex div.* quotations, which came out higher for both issues. There was much more business than usual marked in the Suburban and Provincial Companies; and everything offered commanded a nice price. Advances in quotation were made by Alliance and Dublin, Brentford, and British. The Continental Companies had a very quiet time; and their prices generally remained firm and unchanged. But Tuscan debentures had an advance. Of the remoter undertakings, none made any show, save Belgrano, which continues to push its way up into a better position. Business in the Water Companies was extremely limited; and even an almost general advance in prices—in some cases to a considerable extent—failed to tempt stock into the market. East London was the chief gainer, and was at the same time the most dealt in.

The daily operations were: Gas stocks opened with a fair promise of activity on Monday; and prices were good all round, but quotations did not move. In Water, East London advanced 3. On Tuesday, there were more transactions in Gaslight secured issues than in all the rest of the list put together; prices again being firm and unchanged. Things were quieter on Wednesday; but Gaslight "K" and Tuscan debenture rose 2 each. In Water, Kent gained 5; and Southwark, 1. Thursday was fairly active. Belgrano debenture rose 2½; and British, ½. *Ex div.* changes advanced Commercials and Alliance. In Water, New River debenture was marked 1 higher. There was a lull on Friday, nothing moving, but Brentford new, which rose 3. In Water, East London, Lambeth, and New River went up 2 each; and Grand Junction, 1. Saturday was more than usually active; and Belgrano rose ¼.

## ELECTRIC LIGHTING MEMORANDA.

### The Example of Dublin—The Emergency—The Financial Position—Some Advice Wanted.

WHEN the partisans of municipal electric lighting cite examples of the beneficial operation of this kind of enterprise, they never mention Dublin. In this connection the name of the capital of the "distressful country" is never heard, which, on the face of it, is a somewhat remarkable circumstance. There are, of course, reasons for this reticence; and those who know something about the electric lighting industry and the gas supply of the United Kingdom are quite aware of the nature of the case. But the general public hear nothing of it. When peripatetic deputations of Town Councils are on their travels in search of that successful municipal electric lighting undertaking which they are given to understand is a common object of the country—that undertaking which turns town's rubbish into light, pays a handsome profit, and materially assists the rates—they give Dublin a very wide berth. If any conscientious town councillor should think of trying to verify for himself any of Mr. W. H. Preece's frequent references to the triumph of electricity as furnishing the "poor man's light," it would not occur to him to go to Dublin, where there are both poor people and a municipal electric lighting undertaking. Yet why not Dublin? Here, surely, favourable conditions for municipal electric lighting should exist in abundance. The gas supply is in the hands of a prosperous local Company, which, being owned, administered, and managed by native capital and industry, is naturally hated and attacked at every turn by the Corporation. Having an enormous and unwieldy district to serve, the Company cannot sell gas at anything like the price that would pay handsomely if the business were restricted to a compact compulsory area in the centre of the city. This latter condition, however, is just what the electric lighting undertaking enjoys. It has furthermore the splendid advantage of being administered by a run of

politicians who deem themselves quite competent to create a new heaven and earth in Ireland, if only they had the chance. And how does the matter stand?

Those who have glanced at our "Electric Lighting Notes" from time to time know that all is not as it should be in regard to this Dublin electric lighting undertaking. From information which we published last week it is to be gathered that its affairs are not far short of a crisis. Our electric lighting contemporaries refrain as far as possible from discussing them. There are some facts, however, which do not need discussion to make their import clear; and the latest action of the Dublin Town Council in regard to their Electric Lighting Department is of this order. At a special meeting of the Corporation held on Friday week, upon a requisition emanating from the Electric Lighting Committee, certain recommendations of the gravest importance were considered. The gist of these was that the sum of £20,000 should be provided forthwith for the purpose of renewing the entire system of cables or mains—this step having been found necessary in order to assure a continuance of the service; and that £100,000 should be expended upon the erection and equipment of a new generating station. So serious a prospect as these recommendations revealed seemed to the Lord Mayor to call for the utmost prudence in the preliminary stages of consideration; and he accordingly advised the Council to resolve themselves into a Committee of the Whole House, with the object of discussing the emergency *in camerâ*. This course was duly followed. After two hours' discussion in Committee, the Council resumed, and the Town Clerk read the result of the confabulation. The text of the Committee's report appeared in our "Electric Lighting Notes" last week. Suffice it to state here that the Council decided to take further advice upon the chief recommendations of the Committee; but the £20,000 is is to be obtained and spent at once upon the distributing plant. So urgent is the need that there was some talk of an appeal being made to the Finance and Leases Committee of the Corporation to advance whatever cash might be required to make good the whole of the cables.

The whole business has been severely canvassed in the city. To understand the position aright, it is necessary to refer to the finances of the Electric Lighting Committee, as reported to the City Council last July. The statement of the City Accountant then showed that for the municipal year 1896 the gross revenue of the undertaking was £11,747; the expenditure on revenue account amounted to £8990; leaving a surplus of revenue over expenditure of £2756. This was equivalent to 4·7 per cent. on the capital outlay of £58,029. Out of the gross profit of £2756 the charge of £1073 went for interest on the loan; a small sum of £81 for bad debts was written off the assets shown in the accounts for 1895; thus leaving a balance of £1074 applicable to repayment of loan, depreciation, and so forth. Unhappily, repayment alone required £2213; so that this left a deficit of £1139 to be borne by the rates, without saying a word about depreciation. In 1891 and 1892, when the electric lighting station was new, a rate-in-aid was levied in its support. This was reasonable enough in the circumstances. The rate produced in the two years the comfortable little cash reserve of £6636, which the poor Dublin ratepayers had to pay, whether they would or not, for the new toy of the Corporation. Of course, the rate was asserted to be only a temporary measure. During 1891 and 1892, the fund thus provided was dipped into to the extent of £1199. Next year the draft was £990. In 1894, it began to look as if the undertaking would soon be able to stand alone; for the demand for aid fell to £624. The following year, however, it jumped up to £1316; and last year again £1139 had to be found from the same store. There is now only £665 left; and the demand is for capital to be spent, as stated above, to assure the service against breakdowns. It is no wonder that Dublin is sad in face of this practical failure.

The "Freeman's Journal" is full of forebodings, and so are the other Dublin newspapers; while some argue that the loss incurred so far is attributable to the limited character of the undertaking, and expect that when the larger scheme recommended by the Electric Lighting Committee is launched, the financial result will be different. There is something in this argument, though it does not possess the quality of convincingness. If it were merely the small size of the existing plant that caused the trouble, the future would not be dark at all. The fact appears to be, on the contrary, that the new scheme of the Committee is mainly designed to cover up the failure of the old; and the public want to know what guarantee there is that it will not go the same way in course of time. Dublin cannot go on indefinitely founding new electricity supply installations and "scrapping" the old after five or six years; and if the contemplated move is to be one of a series, the prospect should be faced now and not later. The game of throwing good money after bad is too fascinating when once begun to be easily dropped, especially when the money comes from the helpless public. Few men exposed to the temptation have the strength to resist it and come before the public with a confession of hopeless, irremediable failure. We do not say that this is actually the case of the Dublic Electric Lighting Committee. The words of the "Freeman's Journal" are just: "Plainly the proposal to extend the system all over the city is not to be lightly undertaken. It might easily mean a burden of £30,000 or £40,000 a year to the city, unless a considerable improvement is made in electrical apparatus and methods. That ought to be guaranteed before the Council goes further." It must be borne in mind, however, that the problem before the Dublin Corporation is less technical than economical. The old plant may be defective, and the defects may be curable in the proposed substitute; but is the suggested scheme expedient to be carried out by the Corporation? That is the question, which the highest kind of expert knowledge is alone competent to answer. And if the question of who is to carry out the scheme is carefully withdrawn from the reference, the distracted Corporation of Dublin may obtain the reliable guidance they so greatly need. Meanwhile, their dearly-bought experience is available for the warning and instruction of other Municipalities.

## WATER ACTS FOR 1897.

(*Continued from p.* 790.)

THE Belfast Water Act extends the limits of supply by the Commissioners. The rights of water supply of the Belfast Guardians with respect to Legoniel, Greencastle, and Whitehouse are transferred to the Commissioners, who take over all the financial responsibilities of the Guardians. The constitution of the Commission is also altered. New water-works are authorized, comprising a reservoir for the storage of the water of the Annalong River, in the Mourne Mountains East, a railway three miles long, and several high-service tanks. Power is taken to discharge water into certain streams, under defined conditions. Provision is made for the deepening of a water-course, the erection of pumping-stations, and the disposal of excavated spoil. Additional lands are to be acquired within three years, and the new works completed within twenty years. The Commissioners are to pay the reasonable expenses of the County Surveyor for inspecting distribution works outside the city boundary. For the protection of the Corporation and the inhabitants of Belfast, it is enacted that all necessary street works shall be carefully and properly executed. The Earl of Kilmorey, as owner of the Mourne Estate, is also protected. The additional sum of £120,000 is to be borrowed, repayable in sixty years.

The Colne Corporation Act authorizes the construction of a new reservoir for impounding the water of Wycoller Beck, subject to provisions for the protection of the Calder riparian owners and the Keighley Corporation. The Corporation are not bound to supply water at any elevation which cannot be commanded by their existing Bent's reservoir. The new works are to be completed within eight years. The rate for domestic supplies is 10 per cent. The sum of £110,000 is to be raised for water-works purposes, to be repaid in sixty years.

The Dublin Corporation Act deals with the supply of water by the Corporation to the out-townships, the previous regulation of which is declared to be defective in some respects. It is enacted that in case any township takes a supply of water in excess of the statutory quantity allowed, the excess is to be paid for notwithstanding the non-service on the Corporation of a statutory notice that such excess was to be taken. The method of ascertaining the population of the townships, in order to determine their statutable supply, is defined. After 20 gallons per head have been served out to this population, the excess is to be charged for at the rate of 3½d. per 1000 gallons. It is made competent for the Commissioners of any townships supplied by the Corporation to apply to be supplied with water for all purposes at the uniform price of 2·4d. per 1000 gallons; and the Corporation are thereupon bound to afford the supply upon these terms. After ten years, this price may be revised by the Board of Trade. These supplies are to be metered. The Commissioners of Kingstown are to make a certain extra payment to the Corporation in a particular event. The Townships' Commissioners are authorized to distribute for other than domestic purposes any surplus water they may have to dispose of, subject to the obligation not to charge less for it than is charged for the time being within the City in similar circumstances. The water supply in Clontarf is specially regulated; and the same observation applies to Bray.

The Dumfries and Maxwelltown Water-Works (Additional Powers) Act amends and extends statutory provisions made in 1850 and 1852. The Commissioners are constituted as a body corporate under the name of the Dumfries and Maxwelltown Water-Works Commissioners. The limits of supply are extended to the limits of the two burghs. The qualifications of Commissioners and electors are defined. The conditions of compulsory supplies are prescribed. Water may be sold by measure for all purposes. The domestic water-rate is not to exceed 6d. in the pound, with a public water-rate of 2d.

The East Warwickshire Water Act confirms an agreement for the transfer of the undertaking of the East Warwickshire Water-Works Company to the Urban District Council of Nuneaton and Chilvers Coton. The Company was incorporated in 1882, and at the time of transfer the paid-up capital amounted to £18,670, together with a debt of £12,376, upon which there was an arrear of interest amounting to £2988. The consideration for the transfer was the payment of £23,600 in bonds and £5400 in cash, besides all costs, value of stock in trade, &c. The sum of £50,000 is to be borrowed for the improvement of the water-works. Surplus profits are to be applied in reduction of the domestic water-rate. The principal water-works consist of a

well and pumping station in the parish of Polesworth, and reservoirs at Nuneaton. The new works authorized are to be completed within seven years. It is enacted that in carrying their line of pipes under the bridge in Ansley Village the Council shall conform to the directions of the County Bridgemaster of Warwickshire. The water-rates authorized by the Act of 1882 are raised 25 per cent.

The Fylde Water-Works (Transfer) Act constitutes and incorporates a Joint Water Board, consisting of representatives from the Councils of the borough of Blackpool and the urban districts of Fleetwood, Lytham, and St. Anne's-on-the-Sea, in Lancashire. The Company was incorporated under seven Acts of Parliament. The constitution of the Board is as follows: Seven members for Blackpool, three for Fleetwood, three for Lytham, and two for St. Anne's-on-the-Sea—five to be a quorum. The Kirkham District Council may qualify a member at any time within one year from the passing of the Act, in which event the number of representatives from Lytham is to be reduced to two. The member for Kirkham may appoint a proxy. Power is given to the Local Government Board to alter the constitution of the Board. The undertaking is to be transferred to the Board for such sum in gross and on such terms as may be agreed upon or determined by arbitration on notice to be served on the Company not later than six months after the constitution of the Board. The Board are to pay the winding-up expenses of the Company. Compensation of officers (not directors or ordinary workmen) is to be settled by agreement or arbitration by a single arbitrator under the Arbitration Act, 1889. After the transfer, section 35 of the Water-Works Clauses Act, 1847, shall be read and apply as if the words "shall be not less than six pounds per centum on the expense of providing and laying down such pipes" were inserted in lieu of the words "shall be not less than one-tenth part of the expense of providing and laying down such pipes." The price of water within and beyond the districts of the constituent authorities is to be the same, and the conditions of supply similar. Any complaints from outside the district are to be heard by the Local Government Board. Fresh charges for the supply of farms are authorized. Certain guarantee payments are readjusted. The loan required for the purchase of the undertaking is to be repaid in fifty years. Surplus profits are to be applied in reduction of the water-rents and charges.

The Harrogate Corporation (Water-Works Transfer) Act authorizes the Corporation to purchase the undertaking of the Company, which has been incorporated since 1846. The Corporation are to give notice to treat for the purchase within three months from the passing of the Act. The value of the undertaking is not to be effected by the passing of the Harrogate Water-Works Act (see *ante*, p. 789); and in addition to the value of the property, the Corporation are to pay the Company's parliamentary costs for the two Acts, and compensate the retiring officers and servants. The rates for domestic supplies range from 10 to 5½ per cent. Water may be supplied by measure for domestic and other purposes. After one year, the water supply is to be treated for the prevention of plumbism, under a penalty of £10 per day for default. The Rural District Council of Knaresborough may acquire their portion of the distributing plant, and thereafter claim a supply of water in bulk at the price of 7½d. per 1000 gallons. The amount of the loan is to be repaid in fifty years.

The Kingston-upon-Hull Corporation Act contains a part relating to water supply. It empowers the Corporation to carry one or more mains, conduits, or pipes beneath the bed of the River Hull, at or near Stoneferry; and to cross any bridges made or to be built in the district. The district of supply is extended. The rate for domestic supplies is 7 per cent. Water may be sold by measure for other than domestic purposes, if so required by either the intending consumer or the Corporation; provided that the charge for water so supplied to any persons not supplied for domestic purposes shall not be less than would be made for the latter purposes. The Corporation are at liberty to apply surplus water profits to such purposes as they may think fit. The village of Cottingham is to be furnished with 50,000 gallons of water per day without charge. Certain Water Acts and Orders enumerated in a schedule are repealed.

The Leeds Corporation Act contains a part relating to water. It empowers the Corporation to hold lands in the watershed of the Washburn in order to prevent contamination of the waters which the Corporation are empowered to take. Owners and commoners are to be compensated. The sum of £335,500 is to be borrowed in regard to these operations, to be repaid in sixty years. Several landowners are protected in various ways.

The Leicester Corporation Act extends the water limits to include the parishes of Sileby, Syston, Mountsorrel, Rothley, Wanlip, Swithland, Cossington, and Thurmaston North, the right of supply in the added area to be exercised within six years. The sum of £100,000 is to be borrowed for water-works purposes, to be repayable in forty years.

The Loughborough Corporation Act enables the Corporation, acting by the Council, to construct a new impounding reservoir upon the Black Brook, in the parish of Shepshed, with connections to the existing Nanpantan reservoir. The works are to be completed within eight years. The sum of £65,000 is to be borrowed for these purposes, to be repaid in sixty years.

The Manchester Corporation Act contains a part relating to water-works. It authorizes the construction of a pipe-line between the easternmost of the Audenshaw reservoirs and the Godley reservoir of the Corporation. The remainder of the clauses relating to this work are for the protection of various interests. The sum of £210,000 is to be borrowed for water-works purposes, of which not more than £100,000 is for the supply of water for hydraulic pressure.

The Newark Corporation Water-Works Act enables the Corporation to construct two new pipe-lines and a service-tank to be wholly situate in the parish of Farnsfield. The works are to be completed within five years. The sum of £4116 is to be borrowed for this purpose.

The Newport Corporation Act authorizes the construction, in lieu of certain works sanctioned by an Act of 1887, of an impounding reservoir formed by embanking across the valley of the Castroggy Brook, in the parish of Newchurch. There is also to be an intake from the Nant-y-Pridd Brook. Powers granted in 1887 for the construction of the Llanvaches reservoir are revived. These works are to be completed within six years. The water of any aqueduct may be temporarily discharged for purposes of repair or cleansing. The sum of £150,000 is to be borrowed for water-works purposes, repayable in sixty years.

The Nottingham Corporation Water Act empowers the Corporation to make a covered service reservoir in the parish of Arnold, and also to construct a well and pumping-station at Boughton; the new works to be completed within seven years. The Southwell Rural District Council are to be supplied with water in bulk at a price not exceeding 6d. per 1000 gallons. The sum of £300,000 is to be borrowed for water-works purposes, repayable in fifty years by three different devices at the option of the Corporation.

The Pwllheli Corporation Act empowers the Corporation to purchase the local water-works from the Company for the sum of £7789. Additional water-works, comprising a service reservoir at Drefain in the parish of Abererch, are to be constructed within seven years. The water-rate for domestic supplies is 8 per cent. Water may be supplied by measure for all purposes. The sum of £4000 is to be borrowed for the construction of the new works, repayable in sixty years.

The Torquay Corporation Water Act empowers the Corporation to acquire certain lands for the protection of their water undertaking, at an estimated cost of £90,000, repayable in sixty years. The money may be raised by mortgage.

The Tynemouth Corporation (Water) Act authorizes the Corporation to acquire the undertaking of the North Shields Water Company freed from a mortgage debt and all claims of the Lord of the Manor, who has a right to one-seventh part of the profits, under an Act of 1786. The Corporation are to pay the expenses of the transfer as between solicitor and client, and employ the present secretary and foreman at the salaries they now receive. The Corporation are empowered to enter into agreements with the Lord of the Manor of Tynemouth for certain objects. The Special Acts of the Newcastle and Gateshead Water Company are altered in favour of the Corporation. The rate for domestic supplies is 1s. 6d. in the pound. Certain premises are only to be supplied by measure or under special contract. The price of water sold by measure is to be 1s. per 1000 gallons. The Whitley and Monkseaton District Council are empowered to purchase their portion of the distributing plant, and claim a supply of not less than 5 gallons nor more than 25 gallons per head of the population per day. The sum of £30,000 is to be borrowed, repayable in fifty years. Surplus water profits are to be applied to reduce the water-rates.

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**"The Commercial Uses of Coal Gas"** is the title of a little book written by Mr. Thomas Fletcher, F.C.S., as a supplement to "Coal Gas as a Fuel." The latter work is doubtless known to most of our readers; and the one now issued, which deals with the various applications of gas in industrial operations, will be found serviceable to gas engineers and fitters, by placing before them information in regard to a new industry which may be made a source of profit. The text is fully illustrated.

**New Issue of "Lass's Analysis."**—Our readers will see, by an announcement which appears elsewhere, that the annual "Analysis of the Accounts of the Metropolitan Water Companies," compiled and arranged by Mr. Alfred Lass, F.C.A., has been published. It deals with the accounts of the Companies for the twelve months ending Dec. 31, 1896, and March 31, 1897, according as they are made up to one or other of these dates. This is the seventeenth year of publication; and the fact may, we think, be taken that the work has established a reputation. It is a unique book for the mass of statistics it presents in convenient form for reference and comparison.

**The Local Government Board and Carburetted Water Gas.**—The statement made by Mr. Holliday, in the course of his Inaugural Address to the North of England Association of Gas Managers, that he understood the Local Government Board had abandoned as unnecessary their project of appointing a Departmental Committee to consider the whole question of the supply of carburetted water gas, has excited some surprise among gas managers. It may be remembered we acknowledged at the time that it was news. As inquiries have reached us on the subject, we communicated with the Local Government Board thereon, and found that nothing was known by the officials concerned respecting the alleged abandonment of the proposal to appoint the Committee.

## OBITUARY.

The death is announced of Alderman A. Dyson, of Flint. Deceased was a Magistrate and an ex-Mayor of the borough, Chairman of the Flint Gas and Water Company, and Manager of the United Alkali Company's works.

We regret to record the sudden death, last Tuesday morning, of Dr. F. W. Barry, Senior Medical Inspector of the Local Government Board. While on duty in Yorkshire about a year ago, deceased injured his head; and it is supposed that some result of this accident may have been the cause of death. The name of Dr. Barry will probably be remembered by our readers in connection with the proceedings of the last Water Commission; he having given evidence on the subject of an outbreak of typhoid fever in the Tees Valley in 1890-91, as the result, according to his investigations, of the supply of contaminated water from the river. Dr. Barry became a Medical Inspector of the Board in 1882; and his work was always marked by great ability, thoroughness, and sound judgment. In addition to his position at Whitehall, he was for some years, and up to the time of his death, Examiner in Medical Jurisprudence and Public Health in the University of Aberdeen—an office which he had previously filled at Edinburgh, and for which he was peculiarly qualified, having been called to the Bar at the Middle Temple.

## PERSONAL.

Mr. H. Percy Boulnois, M.Inst.C.E., the City Engineer of Liverpool, has resigned his appointment. The reasons for this step are stated to be of a purely private nature.

Mr. D. Williamson has been elected Chairman of the Guildford Gas Company, in succession to Mr. Mark Smallpeice, whose retirement was announced in the "Journal" a fortnight ago.

Mr. Benjamin Bark and Mr. Lebbeus J. Woodhead have been appointed Acting Manager and Acting Secretary respectively of the Godalming Gas Company, Limited, in succession to the late Mr. S. Bark.

Mr. E. W. Dixon, the Engineer of the Harrogate Water Company, has been appointed Water Engineer to the Corporation, who will shortly take over the works under the powers conferred by their Act of last session.

Mr. J. B. Braithwaite has been elected Chairman of the Gas, Water, and General Investment Trust, Limited, in succession to Mr. T. Salt, who has relinquished the position, but will retain his seat on the Board.

Mr. James Deas, the Water and Sanitary Engineer of the Warrington Corporation, has had his salary raised from £350 to £500, of which £300 is to be paid by the Water Committee, and the balance by the Sanitary Committee.

Mr. E. E. J. Anderson, at present Assistant-Manager at the Maryhill Gas-Works of the Glasgow Corporation, has been appointed, out of 68 candidates, Manager of the Ripon Gas and Water Works—a position advertised in the "Journal" for Aug. 31.

The Cardiff Town Council have decided to publicly recognize the valuable services rendered by Alderman David Jones, more especially in connection with the provision of an adequate water supply, by presenting him with the honorary freedom of the borough.

Alderman Andrews, the Chairman of the Water Committee of the Bury St. Edmunds Corporation, has been compelled, owing to ill-health, to resign his seat upon the Council, of which he has been a member since 1883. He filled the office of Mayor in 1887 and 1894.

Mr. H. Sayer, Deputy Town Clerk of Sheffield, has been appointed Town Clerk, in succession to the late Mr. Herbert Bramley, whose unexpected death in Brussels was recorded in the "Journal" for the 21st ult. The new Town Clerk has been in the service of the Corporation for more than a quarter of a century.

Mr. W. G. S. Cranmer, eldest son of Mr. J. S. Cranmer, of Stratford-on-Avon, has been appointed Manager of the Willenhall Gas Company, in succession to Mr. J. C. Belton who, as already mentioned in the "Journal," has gone to Redhill. Mr. Cranmer has been for the past eighteen months with Mr. W. A. Padfield, at Exeter.

At the meeting of the London County Council last Tuesday, the recommendation of the General Purposes Committee, that Dr. Frank Clowes, of Nottingham, be appointed successor to Mr. W. J. Dibdin, F.I.C., F.C.S., as Chemist and Superintending Gas Examiner, was unanimously confirmed. Dr. Clowes was introduced, and briefly thanked the Council.

Mr. W. Doig Gibb, who has for some years been Engineer and Manager of the Newcastle and Gateshead Gas Company's works at Elswick, has been appointed Engineer to the Company. The appointment includes designing and superintending the erection of the new works which are to be established at St. Anthony's, on the Tyne, between Newcastle and Tynemouth, for which the Company obtained parliamentary powers last year. Mr. Gibb is the son of Mr. John S. Gibb, the Treasurer to the Edinburgh and Leith Gas Commissioners.

Reference is made in another column to the successful result of the Wakefield Gas Company's assessment appeal, in securing which the Engineer and Manager, Mr. H. Townsend, Assoc.M.Inst.C.E., in co-operation with Messrs. T. Newbigging and Corbet Woodall, necessarily had a large share. The Directors have shown their appreciation of his services by raising his salary by £50 per annum. This is the second increase which has been granted to him by the Directors, unanimously and unsolicited, since his appointment a little more than two years ago.

The members of the North British Association of Gas Managers have erected a monument, in the shape of an obelisk of grey granite, in the Eastern Cemetery, Dundee, over the grave of their late colleague, Mr. John M'Crae, Engineer and Manager of the Dundee Corporation Gas-Works. The obelisk is a handsome piece of sculpture, standing 14 feet high, and bears the following inscription: "Erected in memory of John M'Crae, Gas Engineer, Dundee, as a mark of esteem, by the North British Association of Gas Managers. Died 12th October, 1896, aged 44 years." The Committee of the Association who have had charge of the subject are to visit the memorial next Thursday.

Mr. John Young, the Manager of the Potteries station of the British Gaslight Company, has been promoted to the position of Engineer and Manager of the Company's Norwich station, rendered vacant by the resignation of Mr. Fred. E. Linging, and to which reference is made elsewhere to-day. Mr. Young has had practically a lifelong connection with the Company; and he was entrusted with the management of the Potteries works twelve years ago, on the death of Mr. S. R. Linging. Mr. Young is a member of the Institution of Gas Engineers, and he is President of the Midland Association of Gas Managers. His Inaugural Address at Birmingham early in the year was of a notable character, and fully justified our characterizing it as "a statesmanlike presentment of the bases upon which the prosperity of a gas undertaking rests. Its author will now find wider scope for the exercise of his many excellent qualities as a gas manager; and we cordially wish him success in his new sphere of work.

The works of the Singapore Gas Company were gaily decorated on Saturday, the 18th ult., when upwards of 300 men and their families assembled to make a presentation to the Manager, Mr. Albert Ford, and Mrs. Ford. The ceremony took place on the lawn, where the workmen had been arranged in different classes and castes by Mr. T. A. Scott, who was accompanied by his daughters. One of the latter presented Mrs. Ford with a beautiful bouquet; while Mr. Scott, on behalf of the men, handed to Mr. Ford a set of gold coat-buttons and a coachman's silver cockade, bearing his monogram, and to Mrs. Ford a handsome gold brooch, expressing in felicitous terms the good wishes of the donors. Mr. Ford thanked the men individually and collectively for their handsome presents, which he said he should regard as an expression of the good-will existing between employer and employed. He hoped this sentiment might long continue. Cheers were then given for Mr. and Mrs. Ford, as well as for Mr. W. T. Batten, the previous Manager, and his family. After the presentation, refreshments were partaken of; and the afternoon was spent in various amusements, which were kept up till a late hour.

We learn that Mr. Fred. E. Linging, Assoc.M.Inst.C.E., has resigned his position as Engineer and Manager of the Norwich station of the British Gaslight Company, Limited—an appointment which he has held for about twenty-two years. The reason assigned for this step is impaired health resulting from pressure ot work. The resignation dates from the 1st inst.; but it may be a few months before Mr. Linging relinquishes his duties. He has received from the Chairman of the Company (Mr. J. Horsley Palmer) a very cordial letter expressing the regret of the Directors in accepting the resignation. Mr. Linging's experience has been varied and extensive. After completing his articles with Mr. Horatio Brothers, M.Inst.C.E., the Engineer of the Equitable Gas Company, he entered their service. He subsequently became Assistant-Engineer, and eventually Engineer and Manager, of the City of Moscow Gas Company. Later on he joined the Imperial Continental Gas Association; and, after visiting all their stations on the Continent, he took up his abode in Vienna, where, before he left, he had the supervision of the second largest station in the city. From Vienna he went to Norwich. Mr. Linging is granted a pension of £250 a year.

**The Examinations of the Institution of Civil Engineers.**—We have received from the Secretary of the Institution of Civil Engineers (Dr. J. H. T. Tudsbery) a copy of the syllabus of examinations recently appointed to be held annually in February and October, in London, and elsewhere if the Council find it desirable. The examination that relates to the admission of students is based upon the educational regulations which have been in force in regard to this class since 1889. That relating to "election" applies in general to persons deemed by the Council to be otherwise eligible as associate members, except in cases in which they may order an alternative test by the submission of a thesis, and subject to the power of the Council to dispense therewith.

## NOTES.

### The Cost of Power.

The cost of power is always an important consideration for manufacturers; and modern suggestions aiming at the utilization on the grand scale of the superfluous energy of cataracts and torrential streams tend to foster public interest in the subject. There is a general impression, favoured by some popular speakers and writers, that water power must necessarily be considerably cheaper than steam power. But the facts do not support any such general conclusion, particularly when it is remembered that the great unappropriated water powers of the world are not situated convenient to the busy haunts of man. Whatever may be said of the cheapness with which the power of such cataracts as the Falls of Niagara can be made available for industrial purposes, it seems to be proved by the figures collected by the Manchester Steam Users' Association that the cheapest power in the world is that employed in the Lancashire cotton industry. Taking the cost of coal delivered as averaging 7s. per ton, and the general consumption per indicated horse power at 2¼ lbs. per hour, the cost of fuel per indicated horse power for the whole of a mill-year of 3070 hours is 24s. This is not the best result. Mr. Nasmith, speaking before a northern engineering society a short time ago, stated that there are plenty of compound mill-engines working in Oldham to-day which consume, for all purposes, less than 2 lbs. of coal per indicated horse power per hour. Taking coal, oil, labour, stores, and repairs, the Lancashire cost of an indicated horse power, upon the cotton-mill scale of production, is only about 36s. a year—a figure which gives the utilizers of water power something to think about.

### A New Refuse Destructor.

A new pattern of refuse destructor is described in the "Engineer" as having been working with success for sometime past at Lewisham. It is the invention, or design, of Mr. S. Willoughby, of the well-known engineering firm of Willoughby Bros., of Plymouth. Essentially, the Willoughby destructor consists of a furnace and revolving incinerating cell. Unlike other arrangements of the kind, the furnace is fed with good fuel in the shape of coke or breeze, or a mixture of these with coal; it having been found by experience that a fair outlay on good fuel far outweighs in advantages the burning of the refuse alone. The furnace is at the upper end of what is, to all intents and purposes, a revolving retort, built of steel tubes lined with fire-bricks, 27 feet long and 7 feet in diameter at the front, reduced to 5 feet in diameter at the back. The interior is formed with projecting ledges, to catch up and throw down the passing refuse. The cell is mounted upon rollers, and is caused to revolve slowly by gearing; the speed being regulated according to the nature of the refuse to be treated. The cell is charged intermittently by means of a ram; and it does not appear that the heat of combustion of the refuse itself is utilized in any way in the experimental plant, though for larger plants it is proposed to put a steam-boiler in the path of the gases leaving the cell. The working results are reported to be satisfactory as far as the destruction of town's refuse is concerned; but they do not lend support to the idea that there is any possibility of deriving economic advantage from the process. As a matter of fact, the cost of the extra fuel required to burn the rubbish works out at about 4d. per ton of the latter.

### The Lamp Trade and Dangerous Oil.

Recently the "Ironmonger" published the full text of the suggestions for the diminution of the risks of oil lighting, submitted by the Lamp and Stove Trades Association of the United Kingdom to the Select Committee of the House of Commons. The gist of these has already been given in the "Journal." The Association express the opinion, based on practical experience of the members, that accidents with the use of petroleum lamps are due not so much to any radical defects or errors in construction in the lamps themselves, nor yet to the quality of the oil generally in use, as to carelessness on the part of the users, with which may be coupled drunkenness, uncleanliness, and ignorance. "For all practical purposes, it may be assumed that the lamps in general use in this country, if used as they are intended to be, are safe." Notwithstanding this conclusion, it is thought that certain improvements might be introduced with advantage, to meet to some extent the evil of carelessness. The first of these is the raising of the flash-point to at least 100° Abel test. It is pointed out that the oil used in Government establishments is required to have flash-point of 105° Abel test; and it is argued that if such a regulation is necessary or desirable in barracks, where order to a large extent prevails, it must be far more necessary in regard to the homes of the poorer classes, where a small lamp is generally the only light, placed upon a table none too firm, with children about, and in a room the temperature of which must often be between 70° and 80°. The Association touch upon the question of safeguards for the proper retail measuring of lamp oil. With regards to lamps, it is suggested that glass reservoirs should weigh at least 1 lb. per pint capacity. The Association do not unreservedly admire metal lamp reservoirs; but the use of well-fitting wicks is insisted upon. The recommendations conclude with a repetition of the suggestion to raise the flash-point of the oil, which it is not considered would increase the price more than 1d. per gallon.

## TECHNICAL RECORD.

### NOTES ON THE ENRICHMENT OF COAL GAS.

(*Continued from p.* 794.)

#### Enrichment by Acetylene.

Acetylene is the only illuminating hydrocarbon at present produced synthetically on a commercial scale. The modern methods of manufacturing calcium carbide in the electrical furnace, and the production of acetylene from the carbide, have had ample notice in the pages of the "Journal." The attention of English gas engineers was first drawn to commercial acetylene by Professor V. B. Lewes, in a lecture on "The Commercial Synthesis of Illuminating Hydrocarbons."* The rosy future predicted for acetylene by the sanguine lecturer has not yet dawned; and it seems probable now that the sphere of the gas as an illuminating agent is very limited. Considerations of energy lead to the conclusion that acetylene can never seriously compete with other enriching gases for mixture with town supplies of coal gas. The energy theoretically necessary for the production of calcium carbide, is so great a quantity that it seems improbable that acetylene can ever be produced at a cost comparable with that of other illuminating agents, be the raw materials for its manufacture ever so cheap. Its value as an enriching medium for coal gas has been so often discussed that, notwithstanding the fact that it is not at present practically used as such, some of the figures obtained with it are given below.

It has already been pointed out (*ante*, p. 529) that the enrichment value of acetylene is considerably less than its illuminating value when consumed undiluted. The enrichment value increases with the percentage of acetylene in a mixture of coal gas and acetylene. The following are the results of observations on small degrees of enrichment:—

*Enrichment Value of Acetylene.*

| Candle Power of the Coal Gas (Argand burner). | Percentage of Acetylene in the Mixture. | Candle Power of the Enriched Gas. | Description of Burner Used. | Candles per 1 per cent. of Acetylene in the Mixture (Enrichment Value). |
|---|---|---|---|---|
| 13·00 | 0·90 | 13·90 | Best of several | 1·000* |
| 13·00 | 2·10 | 15·10 | " " | 1·000* |
| 13·00 | 4·00 | 17·30 | " " | 1·075* |
| 10·91 | 4·49 | 14·16 | Bray's No. 7 standard union | 0·722† |
| 13·00 | 4·80 | 18·40 | Best of several | 1·125* |
| 13·00 | 9·00 | 23·50 | " " | 1·167* |
| 10·91 | 9·08 | 22·44 | Bray's No. 7 standard union | 1·270† |

* Professor Lewes, "Journal," Vol. LXV., p. 1068.
† Dr. E. G. Love, "Journal," Vol. LXVI., p. 339.

These figures lead to the conclusion that for small degrees of enrichment, each candle added to the illuminating power is obtained by an addition of about 1 per cent. of acetylene. M. Dommer, in his recent text-book entitled "L'Acétylène et ses Applications," quotes results of tests made by Herr Hempel and Herr Wedding on the enrichment value of acetylene, and concludes therefrom that 1 per cent. of acetylene enriches coal gas by about 1 candle. This value may therefore be considered well established.

A recent quotation of the price of calcium carbide made at the works at Foyers was £28 per ton, in quantities of not less than one ton. One ton of calcium carbide should yield, on the working scale, not less than 10,000 cubic feet of acetylene. The cost per 1000 cubic feet would thus be £2 16s.—exclusive of the expenses attached to the generation of the gas, which, however, may be set against the value of the lime obtained. Then the cost of enrichment by acetylene would be as follows:—

*Cost of Enrichment by Acetylene.*

| | At Halifax. | In London. |
|---|---|---|
| Cost of 1000 cubic feet of— | d. | d. |
| Fifteen-candle coal gas . . . . . | 9·00 .. | 12·00 |
| Acetylene, 115 candles enrichment value . . . | 672·00 .. | 672·00 |
| Seventeen-candle mixed gas . . . . . | 22·25 .. | 25·20 |
| Cost of enrichment by 2 candles per 1000 cubic feet . | 13·25 .. | 13·20 |
| Cost of enrichment per candle per 1000 cubic feet . | 6·63 .. | 6·60 |

The price of calcium carbide on which this estimate is based is doubtless very high compared with rates quoted abroad. But making due allowance for a very substantial reduction in the cost of the calcium carbide, it is evident that acetylene cannot be produced at a price which will place it on an equality with other enriching gases. This view is likewise held by M. Pellissier, in his text-book entitled "L'Eclairage à l'Acétylène," published this year. He calls attention also to the difficulty of properly mixing two gases of so different densities as coal gas and acetylene.

#### Enrichment by Exclusion of Harmful Ingredients.

It has already been stated (*ante*, p. 528) that nitrogen, carbonic acid, and oxygen, all of which commonly occur in small quantities in coal gas, are undesirable constituents thereof, and

* See "Journal," Vol. LXV., p. 168.

injuriously affect its illuminating power. It thus becomes necessary to consider whether the expense of removing these ingredients, or at least of diminishing their volume, is repaid by the improvement which the removal or diminution causes in the illuminating power of the gas. The effect of two other constituents of the crude coal gas—viz., ammonia and sulphuretted hydrogen—on the illuminating power may in practice be ignored, since they are invariably removed on account of the injurious nature of the products of their combustion.

In a recent article on "The Estimation of Oxygen in Coal Gas" (*ante*, p. 370), some observations were made on the deteriorating effect of nitrogen on the illuminating power of gas. They reflect in substance Mr. Holgate's treatment of the subject in his recent paper on "Enrichment." The luminosity of a coal-gas flame is diminished by inert gases—such as nitrogen and carbonic acid—chiefly by reason of the reduction of temperature which is brought about by the abstraction of heat by them. Evidently the amount of heat abstracted by equal volumes of inert gases must vary with their specific heats. The specific heat of a given volume of an approximately perfect gas varies as its density; but this law does not apply to readily condensable gases, such as carbonic acid. Therefore, though for the volume occupied by one kilogramme of air the specific heat of nitrogen is 0·2368 and that of carbonic acid 0·3307, and the latter gas should volume for volume abstract nearly 1·40 times as much heat from a source as the former, yet the difference becomes much accentuated at the temperature of the flame, since the specific heat of carbonic acid increases with the temperature. Therefore, instead of 1·40 times as much nitrogen as carbonic acid being required to produce the same degree of deterioration of light in a coal-gas flame, it is found that about 1·83 volumes of nitrogen have the same effect as 1 volume of carbonic acid. The reason of the difference—viz., the increase of the specific heat of carbonic acid with the temperature—does not appear to have been recognized by Mr. Holgate; and even Professor Lewes, in his paper on the "Luminosity of Coal-Gas Flames,"* appears to have passed over this portion of Regnault's classical researches.

In that paper, Professor Lewes states that 1 volume of coal gas of 16·3-candle power required 2·27 volumes of air, 2·30 volumes of nitrogen, or 1·26 volumes of carbonic acid for rendering its flame non-luminous. Thus 1·83 volumes of nitrogen are required to bring about the same effect as 1 volume of carbonic acid. Dr. Percy F. Frankland has found that 60 per cent. of carbonic acid rendered ethylene non-luminous.† Therefore 1 volume of ethylene was disilluminated by 1·5 volumes of carbonic acid; and by the ratio observed for coal gas by Professor Lewes, $1·5 \times 1·83 = 2·75$ volumes of nitrogen should produce the same effect. This proportion is equivalent to 73·3 volumes per cent. of nitrogen in the mixture of nitrogen and ethylene; and Dr. Frankland actually observed that 70 to 80 volumes per cent. of nitrogen were required to render ethylene non-luminous. This concordance of testimony may be taken to establish as correct the ratio of 1·83 between the volumes of nitrogen and carbonic acid which effect disillumination of a gas-flame. Oxygen need not in practice be considered, since it is rarely found in coal gas except in trifling amounts, and may be excluded entirely by careful working. Its disilluminating action on a coal-gas flame is, however, also dealt with by Professor Lewes in the paper referred to above.

It has been shown that 1 per cent. of carbonic acid diminishes the illuminating power of coal gas when it is consumed in an argand burner by 0·5 candle. With lime at 12s. 6d. per ton, and labour on it at 5s. per ton, Mr. Holgate estimates the cost of removing 1 per cent. of carbonic acid from coal gas as 0·1875d. per 1000 cubic feet of gas. Therefore a gain of 1 candle in illuminating power is secured by an expenditure on the removal of carbonic acid by lime purification of 0·375d. per 1000 cubic feet. But if due allowance, at 9d. per 1000 cubic feet, be made for the loss of volume of gas due to the removal of the carbonic acid, the cost of 1 candle gain becomes about 0·55d. per 1000 cubic feet by lime purification. Mr. Holgate, however, considers that with more than 2 per cent. and less than 10 per cent. of carbonic acid, the diminution in illuminating power of the gas is 1 candle, instead of 0·5 candle as taken above, for every 1 per cent. of carbonic acid. On this basis, 1 candle gain would be achieved at an expenditure on lime purification of about 0·28d. per 1000 cubic feet of gas. Taking the ratio already stated between the disilluminating powers of nitrogen and carbonic acid as holding good for small percentages, 1 per cent. of nitrogen in gas should diminish its illuminating power by about 0·27 candle. Nitrogen liberated from the coal itself during carbonization, probably should never amount to more than 2 per cent. of the gas; and the nitrogen from this source cannot be excluded from the latter. But careful working and sound apparatus should prevent the admission of nitrogen from the air and furnace gases. No means exist for the removal of nitrogen from gas; and the most that the gas engineer can do is to limit the amount of nitrogen derived from other sources than the coal. The deteriorating effect of nitrogen on the illuminating power of the gas can only be compensated for by enrichment to the extent of at least 1 candle for every 4 per cent. present. The deteriorating effect both of nitrogen and carbonic acid is considerably greater on flat flames than on the argand flame, which alone is considered here.

Mr. Holgate states that 80 to 90 per cent. of the carbonic acid in crude coal gas can be removed by purified ammoniacal liquor, at very small cost. By the use of a plant devised by him for purifying the liquor, 1 per cent. of carbonic acid may be removed from gas at a cost of 0·024d. per 1000 cubic feet. Therefore 1 candle gain in illuminating power is achieved by an expenditure of only 0·048d. per 1000 cubic feet of gas. No details of the plant are given by Mr. Holgate in his Institution of Civil Engineers paper; but the subject was dealt with in a paper read by him before the Institution of Gas Engineers in 1895.*

No practical scheme has been put forward for the removal from gas of aqueous vapour, which has a deteriorating effect on the illuminating power. According to Dr. Frankland, 2 per cent. of aqueous vapour reduces the illuminating power of gas by 3 per cent.† Mr. Holgate refers to an experiment by Mr. H. Aitken,‡ which shows that the ultimate gain in illuminating power by the removal of 2·8 per cent. of aqueous vapour from 27·24-candle gas is 3·7 per cent. Removal of aqueous vapour from gas on the works is quite impracticable, even though the gas thereby gains considerably in illuminating value.

* See "Jour. Chem. Soc.," Vol. LXI., pp. 322-39.
† See "Jour. Soc. Chem. Ind.," Vol. III., p. 271.

## THE KEMMERLING SYSTEM OF MECHANICAL CHARGERS AND DRAWERS FOR GAS-RETORTS.

By G. VELLEMAN.

**From "Progressive Age;" translated from the "Revue Universelle des Miner."**

The competition with electricity is forcing the gas-works to diminish their selling price and increase the illuminating power of their gas. The Auer burner, the light from which is almost comparable to electricity, has added materially in attaining this end. The necessity for continuous working, the escaping of the penalties, which are often rigorous, imposed on companies by municipalities, has induced them to diminish the risks of labour troubles and renewals of *personnel* by doing away with manual labour for the special or heavy work. The mechanical charging and drawing of retorts has thus to-day become a necessity. The object of this note is to describe the Kemmerling apparatus, which has been used for four years at Kalk with complete success.

One can diminish the cost of manufacture in the retort-house in many ways. First, we can endeavour to increase the production, either by forcing the charges (which involves less frequent charging) or by diminishing the quantity of gas emerging directly from the retort while it is being charged. Secondly, we can endeavour to give a section to the retort which will permit the charge to lie in it in such a manner as to facilitate distillation and at the same time diminish the quantity of graphite produced.

In a furnace, while working, the retort is bright red all over, and radiates heat to all parts of the charge; so that not only does the carbon deposit immediately upon the bottom, but also upon the top surface. Graphite accumulates at the arch of the retort, produced especially by gas formed while charging the bottom where the coal lies upon it. This gas rises to the arched top which is very hot, decomposes and forms a deposit. Owing to the coal which distils at the bottom of the charge, where it encounters the necessary heat, vaporizing and passing along the incandescent bottom, its partial decomposition deposits carbon there. This permits the caking of the coke, and prevents the formation of "feet" upon the bottom of the retort, allowing the coke to be removed very readily.

But the gas in going off meets greater difficulties, as it has to pass through the overlying masses of incandescent carbon, which causes it to decompose again. It is best to give the charges in the retorts the greatest surface not in contact with the retort and diminish the depth of charge. An advantageous form would be that of a ridge giving the charge a triangular form with long sides, while a horizontal or concave surface would give more bottom and less free surface to allow the gas to escape from it readily. In a triangular form, the charge has also more free space to swell up, which facilitates drawing. The concave surface is obtained by the spoon-shaped charger when, in withdrawing, it trails along the bottom of the retort.

In order to realize the first means spoken of—that is to say, by forcing the charge in order to diminish the loss of gas during charging—it is long since the shovel was replaced by the spoon-shaped charger. The shovel, which is still used in many works, requires two men, and is irrational because they put the large pieces in the rear end of the retort to facilitate charging and drawing. This tendency to charge the large pieces is more apparent as the retort is longer. One cannot charge fine coal alone by this system, as it allows but a small quantity to be held on the shovel at a time, and cannot easily be thrown to the rear part of the retort. All depends hence on the size of the coal, and the method prevents any judicious mixtures designed to form a more advantageous charge.

With the spoon-shaped shovel, charging is done more easily, and permits the retorts to be 10 feet long—a practice which is

* See "JOURNAL," Vol. LXV., p. 1133.
† See "Jour. Soc. Chem. Ind.," Vol. III., p. 276.
‡ See "JOURNAL," Vol. XXXI., p. 803.

liable to become general. The coal can be arranged as desired in the retort; the manipulation is rapid; and the loss of gas during charging diminished. Unfortunately, if it is held in suspension in the retort, five men are necessary—four to carry and one to manipulate the charger and to turn it—as the total weight is 440 to 550 lbs. If the charging-scoop is let drop upon the bottom of the retort, turned and dragged out over the bottom, three men are necessary. The charge is then spread along the sides of the retort, and some of it may possibly be drawn out again by the weight of the scoop. In either system the charging is done by hand, and there is still the temptation to put the larger pieces near the rear end.

A good mechanical device for charging which permits the use of small coal, selection in the making up of charges, and their arrangement in a ridge in the retort, is that of J. Kemmerling, used in the Kalk works, near Cologne. It consists essentially of an endless chain conveyor traversing a movable trough which can be run into the retort and drawn out again. As the trough is withdrawn, the conveyor delivers coal from its end along the bottom of the retort.

Heat does not affect the conveyor flights or chain. The one at Kalk, after four years' use has not yet been repaired, and is always in perfect condition. The parts have sufficient play, so that expansion through heat does not bind them. The distance between the outgoing and return part of the conveyor is as small as possible, to allow as much space as possible for the charge of coal carried. They have links 2·3 inches long and a distance of 3·25 inches between the out and in going parts of the conveyor. A delicate point was the design of the driving wheel of this chain which should work outside of the retort—*i e*, upon the return chain. It was necessary to drag the chain by sprockets only at the point where the chain quits the sprocket-wheel, and to have at this point only two teeth of the wheel in contact with the chain. This problem was solved perfectly at Kalk, as four years of successful work demonstrate. The conveyor runs over an idler placed at the end in the retort. This idler is thus submitted to the action of heat, against which it is protected by the coal which covers the conveyor, and by a strong current of cold air obtained by the arrangement of the trough. Protection of the chain against heat is so easily obtained that after each charge one can bear the hand upon the flat top of the conveyor flights and the chain. The conveyor is of the platform type.

The sides of the trough keep the coal upon the chain. During charging, the coal rubs against the sides of the trough which have been modified by inclining them inward, giving the trough a trapezoidal section. To decrease the resistance which may cause the accumulation of powder on the chain, a little play between the chain of the conveyor and the sides of the trough is given, which is still greater at return. The powder falls to the bottom of the trough, and is drawn out by the return part of the conveyor, and received in a box which is emptied once or twice a day. In this way all deposits and losses of coal are avoided. The top part of the conveyor chain is still further protected by two iron strips fastened to the inside of the trough, between the lower vertical sides and the upper inclined extension carrying the coal. This trough increases gradually and proportionally in section as it nears the end, thus avoiding any liability to clogging.

The chain conveyor is the principal part of the Kemmerling charger. It is fed from a hopper placed on a travelling crane, which carries enough coal to fill all the retorts upon one level, and is connected with the conveyor by a closed shoot. Suppose a retort holds 440 lbs. of coal. For two furnaces of seven retorts arranged in tiers of 2, 3 and 2 each, it is necessary to carry a maximum of $3\times2\times440$ or 2640 lbs. of coal. For seven double furnaces of the same construction, the hopper should contain $7\times3\times2\times440$ or 18,480 lbs. of coal or 9¼ short tons. The size will hence vary considerably according to the number of retorts to be charged in a row. The apparatus conforms pretty well to requirements. To show this the better, it is necessary to give some practical data.

In normal work one can secure with a labourer an effort of scarcely 44 lbs. On the other hand, on account of the difficulty of applying this effort at one place, it would be necessary to use straps. But it is not necessarily intended to operate this apparatus by hand, as electricity or other mechanical forces are more advantageous. The total weight of the conveyor charged with 440 lbs. of coal includes the trough as well as the travelling carriage which carries it, and which runs on rails. This total weight would be for an apparatus for charging 10-feet retorts and with a floor width of 21 feet as follows:—

| | |
|---|---|
| Total weight of apparatus . . . . . | 3106·7 lbs. |
| 20 per cent. for friction . . . . . | 621·5 ,, |
| Total weight (Q) to be raised between two tiers of retorts . . . . . | 3728·2 lbs. |

The four chains raising this weight should be made of ⅝-inch round iron. For this number of chain a 4-inch windlass can be used with a diameter *b*. It follows that, to raise this weight by means of a wheel provided with a worm engaging with a hoisting wheel of 33½ inches diameter, it is necessary to give this worm wheel a number of teeth ($n$) determined by the formula $nPa = 3Qb$, where P = 44 lbs., the effort of a man, $a$ = 33½ inches and $3Qb = 3 \times 3782{\cdot}2 \times 4 = 45386{\cdot}4$; $3Qb$ is taken instead of $Qb$, in order to take into account the friction of the screw. From this $n = 30$.

A wheel of thirty teeth, 4·81 diametral pitch, and 2-inch pitch of the screw-thread should support $\frac{3782{\cdot}2}{4181} = 708$ lbs. Or, in practice, this wheel, built according to the standards of the Gruson works of Magdeburg, could support a pressure upon its teeth up to 1056 lbs. It is hence large enough. With this wheel the speed of lowering of 3·28 feet per second by the chain given, would be, $\frac{2400}{267} \times \frac{0{\cdot}314}{30} = 9{\cdot}4$ inches per minute. To descend a distance of 43 inches, the space between the top and bottom row of retorts requires five minutes. If one wants to fill all the retorts of a furnace, from 2·5 to 5 minutes are necessary to pass from one row to another, and the adjusting of the proper height of charger to the retort requires from 10 to 20 seconds. But this would not be the same if the weight to be raised was to be considerably increased—say, double or triple. Counting the strength of the workman at the elevating chain to be always 44 lbs., the time would increase proportionately to the weight raised. Heavier chains would be necessary, of a size corresponding to the stress, and of which the lengthening would be annoying.

The question of charging-chains, hence, involves the maximum weight raised. Where the hopper should take a considerable charge, it is fixed permanently upon the girders or bridge of the travelling crane, and charged with coal, at a given point in the retort-house before each trip, by a bucket elevator. In this case the chain conveyor, with its raising, lowering, and travelling mechanism, is a system which can be detached from the hopper and crane. The connection between these two and the charging point of the conveyor is effected by means of a sliding shoot, which lengthens in telescope fashion, as desired, to accommodate itself to the raising or lowering of the conveyor. As retorts in France have generally an effective length of 9·8 feet, the entire arrangement presents this important advantage, that in the large works the raising and lowering mechanism and the charging chains require only such labour and skill as could be furnished by apprentices. In small works, where the apparatus has but one or two benches to serve, the hopper can be placed in permanent contact with the rest of the apparatus, so that it will descend and rise with it. This is the arrangement used at Kalk, with two adjacent benches of seven retorts each. With this arrangement the hopper can be charged by hand by lowering the whole apparatus into a pit.

In an equipment made for a works in the North the total weight of the apparatus (including the travelling crane, girders carrying the fixed hopper, and the conveyor carriage) was 11,000 lbs. With the charge of coal the total weight became 16,500 lbs. The diameter of the crane wheels was 20 inches, and they were connected by a shaft, 2·2 inches diameter, controlling lateral movement. Generally we can apply the formula—

$$f\,Q\frac{d}{D} = P,$$

in which $f$=the coefficient if rolling or sliding = 0·15; Q = 165,000 lbs.; $d$ = 2·2 inches; D = 20 inches. Then

$$P = 0{\cdot}15 \times 16{,}500 \times \frac{2{\cdot}2}{20} = 272{\cdot}25 \text{ lbs.}$$

If we start with a power of 44 lbs., as before, we get—

$$D = \frac{0{\cdot}15 \times 16{,}500 \times 2{\cdot}2}{44} = 124 \text{ inches,}$$

or a radius of 62 inches. One can readily obtain this in all cases, because of the height given to the hopper and the crane-track. If we use a lever 62 inches long, working by means of a ratchet on the driving shaft of the crane, we have a system which is excellent, because it does away with gear-trains necessary in all other systems to reduce the load of 16,500 lbs. to equal the power of 44 lbs., and it permits the driving wheels of the crane to be acted upon directly.

Granting that a workman can give this lever fifteen pulls per minute through 16 inches, this will produce a velocity of $15\times16 = 240$ inches per minute at the circumference of a circle 124 inches diameter, or a velocity of $\frac{20}{124} \times 240 = 39$ inches per minute at the circumference of the driving wheel of the crane. In using two levers, which hang down within reach from the floor, the speed will be $2 \times 39 = 78$ inches, or 6½ feet per minute. These two levers are fastened to the driving-shaft of the crane, and are worked alternately by the same man.

In case the weight of the travelling crane for lateral progression is 28,600 lbs., the levers will have a double length of $0{\cdot}15 \times 28{,}600 \times 2{\cdot}2 \times 0{\cdot}023 = 217$ inches, or 18 feet. This is a length of 9 feet for each lever. The speed of transmission will be—

$$16 \times \frac{2 \times 15}{60} \times \frac{20}{217} = 0{\cdot}75 \text{ foot per second,}$$

or 45 feet per minute. This is satisfactory, as it allows the space between furnaces, usually 10 feet, to be traversed in $\frac{10}{45} = 0{\cdot}22$ minute, or 13 seconds. Upon occasion, this velocity can readily be increased to almost double.

Having shown that the raising and traversing movements of

the travelling crane charger can be done by hand at a sufficient velocity, it remains but to enter into the construction details. A rigid frame formed of I-beams bound together by channel and angle-irons, carrying four truck wheels grooved to receive the rail upon which it runs, has fixed upon it the coal receiving hopper, of square section, terminated below by a truncated pyramid, with sides inclined 45°. To ensure the descent of the coal, at the opening is fixed the cast-iron entrance into the telescope shoot. This consists of a piece of iron, forming the transition between the pyramidal and prismatic passages, and carrying a horizontal hinge to which is fixed the upper end of the shoot, and covering the whole side of the entrance to aid the sliding of coal from above. To ensure the passage of the coal through the entrance into the mouth of the shoot, there is put transversely, at a convenient height, a cross-piece which retards the descent by keeping a considerable quantity in suspension and permitting it to fall freely, but not enough to choke the shoot. The shoot is formed of two pieces—an interior shoot attached directly to the cast-iron hinge at the entrance, and an exterior one covering the other completely and sliding over it. The movements of the shoots are guided by iron plates fixed to the sides. On either side an iron plate fixed to the external shoot slides exactly between two parallel iron plates fixed upon the shoot. On leaving the shoot, the coal is received into a large trough fixed to rest on a beam and having special arrangements to avoid the crowding of the coal, which should descend upon the conveyor freely. The opening of this hopper is smaller than the size of the conveyor trough into which it empties, so that the coal cannot be scattered about.

The top of the coal upon the conveyor cannot get above a certain limit, which is determined by a vertical fixed plate, the lower edge of which scrapes over the top. After having struck the side guard-plates, the coal falls into this small hopper, and continues to fall upon the conveyor until its complete withdrawal, which automatically raises a hinged bottom, and so shuts off the supply. When the retort is charged, the withdrawal should be made without scattering the coal. On charging the next retort, upon introducing the conveyor into it, the hinged bottom falls of itself, and the coal runs from the shoot and rests upon the conveyor. While the introduction continues, the conveyor simply receives the coal. When it has reached the near end of the retort, it stops until the bottom is full, then withdraws slowly, while the conveyor delivers coal from the end, filling the retort as full as desired. These movements are obtained by a carriage with four wheels running upon the carriage porter-beams. To this carriage is rigidly fixed the shoots and the conveyor charger and all the mechanism. This carriage, with its wheels, forms a free and independent system, which can be detached from the iron framework. Thus, one can replace the chain conveyor with its carriage without touching any other part of the apparatus. One can, hence, have an extra conveyor at hand to substitute for the one in operation, if it should be so desired. One pair of wheels rests upon the rails of the carriage, the conveyor hanging upon them, while the rear wheels rest on the under side of the beam; the distance between the two sets of wheels being from 40 to 56 inches, while the conveyor itself, for a length of nearly 10 feet, overhangs. The raising-wheels are not fixed on the same shaft, but those of the withdrawing carriage are. Raising and lowering is done in the same way as the charging. A pinion is placed between the crank-wheel and the raising-wheel, and it is then connected.

At Kalk, 495 lbs. are charged at a time into a retort, having a length of 8·7 feet, by 20 turns of the crank during the withdrawal while charging. This withdrew the charger 8·2 feet, with a diameter of the chain driving-wheel of 6·6 inches. But the movement should be such that the conveyor belt could be moved without operating the withdrawing mechanism, in order to completely fill the end of the retort. For this purpose, upon the shaft of the lower wheels is placed a drum, upon which are wound two chains (one crossed) fixed to each end respectively of the carriage, so that in turning these drums in one direction or the other, the carriage is made to travel back or forth. At Kalk, the withdrawing and charging occupies 15 seconds. If the gear at entry would be twice that of withdrawal, the entire duration would be 23 seconds. To charge the back end of the retort, the carriage gear would have to be thrown out for a few turns; then thrown in again. This is readily done by a lateral movement of the pinion shaft—a common arrangement.

To introduce the conveyor into the retort, the sprocket wheel is cut out of the train. To withdraw, it is put in, and the contrary motion pinion of the carriage introduced. The work is done usually by two men who, besides the conveyor charging, could fill the charging-hopper, which contains an overcharge of over 2200 lbs. The carriage framework is rigid, and made of angle-iron. At its ends it is suspended by four chains, rolling over loose pulleys to cause it to ascend or lower as desired.

The same apparatus can be used in small works as described for large plants, except that the hopper is fixed permanently to the conveyor charger-frame, which raises or lowers as before. To fill the hopper, the conveyor carriage is lowered with it; both being suspended by chains from windlasses on the travelling crane, so low that it can be filled by hand—doing away with all elevator mechanism. The operation is the same as before described in the larger apparatus. The hopper remains in place on the carriage, while the chain conveyor is run into the retort, and requires the same attendance. At Kalk, the arrangement is different; the hopper moves with the conveyor. There is no shoot; but the coal descends directly upon the conveyor the whole length of the hopper. To prevent overcharging, a sliding door is placed above the conveyor chain. This arrangement, which appears simple at first sight, is not strong nor rigid. At each retort filling it delivers 2200 lbs. of coal, or more, requires a greater effort on the part of the workmen, and wears out the conveyor parts. Instead of the large frame used for the conveyor, the small hopper at Kalk is suspended by chains from a car moving along the girders of the travelling crane. The least kink in a chain makes itself felt more easily by reason of its small lift. The long suspension of the conveyor reduces the swinging, though its entrance into the retort demands more attention on the part of the workmen. Again, one does away with the space between the crane and the carriage, which may easily amount to 3¼ feet.

The question of mechanical charging by hand power, being settled by the Kemmerling apparatus, it remains to be seen how the reverse service can be performed mechanically.

In hand work to remove the coke, a rake is inserted and the coke drawn out. A large poker is introduced into the mass, the hook part turned down into the coke and drawn out, bringing with it a mass of coke in size proportional to the distance the poker had penetrated into the retort. This apparatus could resist the heat sufficiently well. The Velleman arrangement, which has been tested by actual use in gas-works, is described as follows: The triangular shape of the charge delivered by the Kemmerling apparatus is taken advantage of, as it retains that shape quite well, nothwithstanding the swelling and coking of the coal, by gripping either side by the two prongs of a poker. These prongs are rigidly fixed by a pin into a cast-iron socket carried by an I beam which forms a carriage by means of three wheels moving upon two parallel rails placed in the same vertical plane as the centre-line of the beam—the one below, the other above it. These rails are fixed to a traveller made of angle-iron, and can be raised or lowered by means of chains running over pulleys of small diameter fixed upon shafts and moved by a worm gear with a chain wheel to operate it.

The pokers carry tines at their ends, bent at right angles to their axis. In passing through the retort, these tines are liable to scrape against the bottom. It is hence necessary to turn them in such a manner as not to rub the walls of the retort, and direct the tines toward each other. This operation requires more or less effort, which is easily supplied with the Velleman device. He fixes upon the socket which carries the short pokers two light wheels, into which he introduces two portable levers, 40 inches long, so that a man with 44 lbs. of effort can produce a pressure of 220 lbs. if the length of the tines is 8 inches. To prevent drawing out of coke, the tines are kept in place by ratchet-wheels on their shafts. When drawing is desired, a toothed rack is fixed at the side of the lower rail of the carriage, into which gears a pinion connected with a wheel. This wheel can be provided with a long sliding lever crank when great power is desired.

If the coal produces a very firm coke, it may all come out at once, and in such a large piece that it will be difficult to handle by the apparatus. In this case, the tines are sunk into the coke oftener, cutting the coke into pieces which can be conveniently handled. At each stop the hooks are forced into the coke, breaking off a piece of the desired size, which is then drawn out before going further. The hooks are introduced in such a manner as to keep as near the top of the arch is possible.

This mechanical drawer can be attached to the travelling crane used for the Kemmerling charger. If it is preferred to transport the drawer independently, it can be hung from a traveller trolly wheel suspended from a track overhead. Parallel movement may be obtained by means of a rack placed beside the rails, and in which a geared wheel on the trolley engages.

At large gas-works the charging of hoppers requires special provisions to avoid hand work and loss of coal. The coal is raised to the desired height by means of a bucket elevator so proportioned as to size and speed as to fill the hopper in about 15 minutes. A system of two elevators for each hopper could be used where there were two sets of apparatus on parallel tracks to charge all the furnaces. But in most cases where the furnaces lie in different directions, the distribution of coal to the several hoppers is done by means of horizontal flight conveyors, upon which the bucket elevator delivers the coal by means of a balanced pivoted shoot. The velocity of transmission of both systems is the same. All these charges are operated from the same central station.

Instead of flight conveyors, platform conveyors running on wheels may be used, or pan conveyors running on wheels, which are charged by a moving hopper system. The latter system, proposed by the Behr factory at Jupille, has the advantage of requiring less force, and doing away with wear and tear due to sliding of the flights and coal over the sheet-iron troughs.

The author made bucket elevators and flight conveyors in accordance with those used by coal washers. Where the service is so trying as to justify their proper construction, all loss of coal is avoided. The coal dust that the flight conveyors make on their return trip is collected in shafts at the centre of operations. The use of steam being necessary in the furnace room for the tar apparatus, one can, of course, use it instead of

gas for the power necessary to drive the machinery. In any case the expenditure for power will be small—say about 1 to 1·5 horse power per conveyor.

As an average, the coal charge of a retort produces 8000 cubic feet of gas during four hours of distillation; but with the same charge, and the most favourable conditions of distillation, and a forced working which terminates in three hours, the production of gas is four-thirds times as great as the average, in the same time.

With 8000 cubic feet production, the average per 1·5 minutes will be $\frac{8000 \times 1{\cdot}5}{4 \times 60} = 50$ cubic feet. In the Usine du Nord, where two men are required to a shovel, the charging is done in 1·5 minutes. With the described apparatus this can be done in 23 seconds. Other conditions being the same, this means an economy attained of $\frac{8000\ (90-23)}{4 \times 60 \times 60} \times \frac{4}{3} = 50$ cubic feet per retort and per period of distillation, or, for six periods per day 300 cubic feet. Taking a gas-works operating with 28 furnaces of seven retorts each, or 196 retorts, and a mean annual firing of 200 days per year, we get, with the Kemmerling apparatus, an economy of $30 \times 200 \times 196 = 11{,}760{,}000$ cubic feet. With the price at 23 c. per 1000 cubic feet, the economy realized to the works would be the greater part of £550.

The regular distribution of the charge permits not only the better distillation, but also a heavier charge. Thus it is that at Kalk they can increase the charge from 330 to 500 lbs. The production in gas per 100 lbs. remains the same; so that to obtain a given volume of gas the number of charges can be diminished in the ratio of 500 to 330. At this rate the preceding economy becomes

$$\frac{500}{330} \times 550 = £812 \text{ per year.}$$

Besides the economy in production, other advantages result from uniformity of charge combined with mechanical drawing. At Liege (Usine de Longdoz) they made some tests which gave a large production of gas and coke which was very compact. Unfortunately the difficulties of hand labour caused them to abandon the apparatus. In all cases the large coal was of no advantage to the gas retorts; so that it could be separated and sold at a profit.

Finally, there is the economy in manual labour. To charge and draw 14 furnaces of seven retorts each, two workmen are required to operate the Kemmerling apparatus. One thus saves four workmen per gang. The charging is always uniform, and the same for all the retorts; while with hand work it depends upon the judgment and good will of the workman. A works in the north of France to-day uses hand labour in two gangs of four men each, the drawing lasting 4 to 4½ minutes per retort. We will not include the men who remove the coke drawn, as they are necessary for either method.

With the Kemmerling system, in four hours it is necessary to allow 30 minutes for charging the hopper three times. There remain then 210 minutes to draw and charge 98 retorts, or 2·14 minutes per retort. This is sufficient. The two men operate the apparatus alone; the coke shovelers opening and closing the retorts.

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**The "Venturi" Water-Meter.**—Several references have been made in the "JOURNAL" to this meter, which is capable of measuring large quantities of water. Some records of its work are contained in the last annual report of the Water Commissioners of Reading (Pa.). Upon the advice of their Engineer and Superintendent (Mr. E. L. Nuebling), meters of the above-named type were introduced at the beginning of the year 1896 to register the quantity of water flowing into the distribution system. Readings were taken every night and morning; and besides registering the consumption, the meters once or twice, by their indicators, called attention to carelessness of employees in leaving the gates of the large mains closed. The highest daily consumption was on July 20, when 7,883,000 gallons were recorded; the lowest was 4,141,000 gallons, on April 5; and the average was 6,020,000 gallons, or 82½ gallons a head daily.

**American Gaslight Association.**—The 25th annual meeting of the Association will open to-morrow in the Hotel Chamberlin, Old Point Comfort (Va.), under the presidency of Mr. Charles H. Nettleton, of Derby (Conn.). According to the announcement made by the Secretary (Mr. Alfred E. Forstall), there will be six papers; and several topics will be brought under discussion by means of short written introductions. The only paper dealing with gas manufacture will be by Mr. H. A. Mather, of Brooklyn, who will lay before the meeting some "Chemical Notes on Purification." Three subjects relating to distribution will be discussed. Mr. A. S. Miller, of Long Island City, will give "Some Further Experiments on Interior Illumination;" Mr. P. Doty, of Long Branch, New Jersey, will present a "Report on Burner Stoppages;" and Mr. K. M. Mitchell, of St. Joseph (Mo.), will describe a method successfully employed by him to obviate trouble from naphthalene. Mr. R. M. Searle, of Atlanta, will discourse on "Gas Advertising;" and there will be a paper by an author whose name and subject will only be disclosed at the meeting. The business will, as usual, extend over two days; Friday being devoted to an excursion.

## REGISTER OF PATENTS.

**Incandescent Gas-Burners.**—Richmond, J., Brennand, J., and Pedder, W., of Burnley. No. 24,110; Oct. 29, 1896.

An essential feature of this invention consists in entirely precluding the admission of air to the burner through the globe from below, as is usual with this class of burner, but in permitting the free ingress of air from the top. The air passes from the top between the globe and the chimney, "in such a manner as to be rarefied by the heat of the chimney in passing, and finally enters the chimney through air-inlets or orifices at the bottom, in a highly-heated condition, raising the light to incandescence."

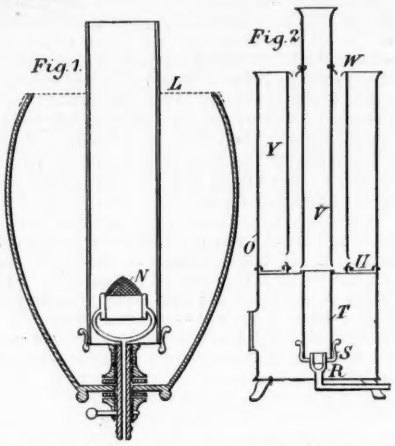


Fig. 1 is a sectional elevation of a "regenerative incandescent gas-burner" constructed in accordance with the invention.

The globe is formed with, or has fixed to it, a flat base provided with a central hole for fitting on the burner of the usual argand type. The cold air enters from the top through a gauze or other covering L, and flowing down the sides of the lamp chimney "becomes highly rarefied previous to passing to the burner." A piece of gauze N (either conical or otherwise) may be fixed at the top or bottom opening of the burner, to prevent any possible fluctuation in the light; and becoming heated this will "assist in liberating the oxygen of the air as it is approaching the flame."

Fig. 2 illustrates the invention as applied for heating purposes. The argand burner R carries the short extension pipe T; and near the mouth of this pipe are rests U, fixed to the sides of the cylindrical casing O, and designed to support the moveable or loose funnel or chimney V. The cold air is drawn from the orifices W at the top, and passes down the external sides of V to the burner, and in its passage becomes highly heated previous to entering the mouth of the burner. A piece of wire gauze may be substituted for the perforations W. The air-passage around the sides of the chimney V is contracted by a circular lining X, so that the absorption of heat may be more complete in the passage of air to the burner. The space Y between the lining X and the inner surface of the casing serves as a chamber for the retention of hot air radiated from the pipe T.

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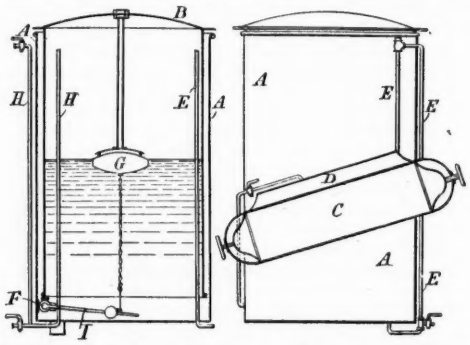
**Generating and Storing Acetylene.**—Kay, A., of Doune, N.B. No. 24,611; Nov. 4, 1896.

This apparatus consists of a water-tank A and a gasholder B. The generating cylinders C are secured to the side of the tank in an inclined position. The condenser D, placed over the generator at a similar angle, permits any water that may pass into the condenser with the gas



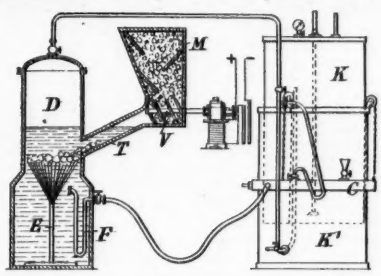

to gravitate back to the lower end, whence it returns to the generating cylinder. The gas as generated is conveyed from the condenser upwards by the pipe E to a gas-valve, which prevents the back-flow of gas into the cylinder when recharging it. The gas passing through the valve is conveyed to the lower part of the gasholder and upwards within it; and any water flowing over is removed by the drip-cock at the bottom. The water for generating the gas from the carbide is supplied from the tank A (through a valve F) to the generator, to which it is admitted at the top from the condenser through a valve and injector, in a fine stream or spray on the carbide. This water-valve is controlled by a floating ball or disc G, fitted to slide on guides up and down on the two vertical inlet and outlet gas-pipes E and H inside the tank A. It is connected to the end of a weighted valve-lever I by a chain.

When the holder is at its lowest position, the disc above the float G presses on the ball, and, slackening the chain, relieves the valve-lever I from the lifting action of G, and allows the lever to fall downwards to open

the valve F and water to flow in upon the carbide in the generator C. Gas being generated, the holder B and disc above G rise and relieve the floating ball, which raises the lever I, and closes the supply-valve F until the quantity of gas generated is consumed. The cycle of operations is then repeated.

**Acetylene Producing and Storing Apparatus.**—Chesnay, E., and Pillion, L., of Dijon, and Bertolus, C., of St. Etienne, France. No. 25,236; Nov. 10, 1896. Date claimed under International Convention, May 9, 1896.

This apparatus (as shown) comprises a gas-generating receptacle or vessel D, communicating with a gasholder K by means of a flexible pipe.



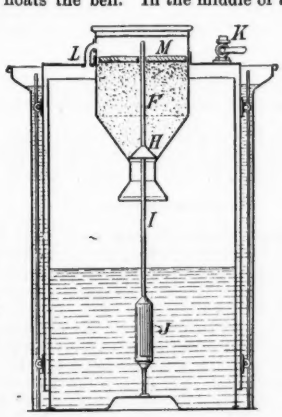

The vessel is also connected at the lower part, by a flexible pipe, with a closed hollow vessel C surrounding the lower portion of the holder, and acting as a balance or counterweight to the holder bell (to which arrangement this application is not intended to extend, it having been embodied in a prior application for a patent). A syphon F is arranged in the vessel D, to prevent the flexible pipe being crushed by the lime produced as a result of the chemical reaction. A foot E, which carries a support formed (as shown) of a bundle composed of circular rows of rods gradually diverging from each other at the top—the points or upper ends being substantially in the same horizontal plane, so as to support the carbide—is also provided in the generating vessel. On one of the side walls of D, there is a cylindrical inclined tube T of rather large diameter. It communicates with a hopper M, fitted with baffles, and is filled with carbide of calcium. The tube T is provided internally with an archimedean screw or similar device V, whose shaft is rotated by any suitable motor—say, a small dynamo—with a contact-device composed of two stationary rods, with which co-operates an insulating friction contact-piece carried by the balance-weight C.

Assuming that the hopper is charged with carbide, and that the holder has become empty, then the bell of the holder will have descended, and the weight C caused to rise, so as to bring the contact-piece into contact with the two rods, and close the circuit. The archimedean screw will thus be rotated; and the carbide, following the course of the baffles in the hopper, falls down in small quantities on to the screw, each convolution of which in revolving carries with it a quantity of carbide, which advances gradually and is discharged into the gas-generator D, where the acetylene is evolved.

If the production of the gas be greater than the consumption, the gas will accumulate in the holder until it is filled. The counterweight C will then descend an equal distance to that through which the bell of the holder rises during the process of filling. When the holder has risen sufficiently, the weight C will have descended, and the moveable contact-piece moved away from the contact-rods. The circuit will thereupon be broken, and the motor will stop and arrest the rotation of the archimedean screw—thus preventing the passage of any more carbide into the generator. As the consumption continues, the bell of the holder will descend, and the counterweight C be consequently raised. This will in due course again start the motor for rotating the archimedean screw; and a fresh supply of carbide will thus be allowed to pass into the generator.

**Producing Acetylene Gas.**—Fournier, A., of Paris. No. 25,488; Nov. 12, 1896.

This apparatus is composed of a water-vessel, in which floats a gasholder bell guided by rollers running against rails fastened to the inner wall of the vessel. Within the main vessel, and concentrically thereto, is arranged a holder containing water; an annular space being left between in which floats the bell. In the middle of the dome or cover of




the bell is arranged, above the holder, a box F, preferably of cylindro-conical shape, closed at the top, and provided at the bottom with an opening shut by a conical valve H, secured upon a vertical rod I, which carries a weight J at its lower end. The length of the rod is so regulated that as, owing to the consumption taking place, the pressure of the gas within the bell falls below the desired pressure (whereby the bell will descend with the box F), the lower end of the rod will abut against the bottom of the vessel. The result is that the rod is stopped, together with the conus H; and as the bell continues to descend, it will cause the aperture in F to be opened, and thus allow a quantity of carbide in F to fall through. The production of acetylene gas thereupon increases the pressure in the bell, and the latter will rise. The conus H again closes the aperture in F, until the pressure within the bell falls sufficiently to cause the operation to be repeated. A pipe and valve K lead the gas away for consumption. The box F is preferably in communication with the inside of the holder bell by a branch-pipe L, in order to ensure an equalization of pressure. A metal disc M may be placed inside the box F, so as to cause the carbide to steadily drop from the box as required, and act at the same time as a guide for the rod I passing centrally through it. The weight of the bell box and contents is so calculated that it counterbalances a pressure of (say) 10 centimetres of water at the time the rod I touches the bottom of the vessel.

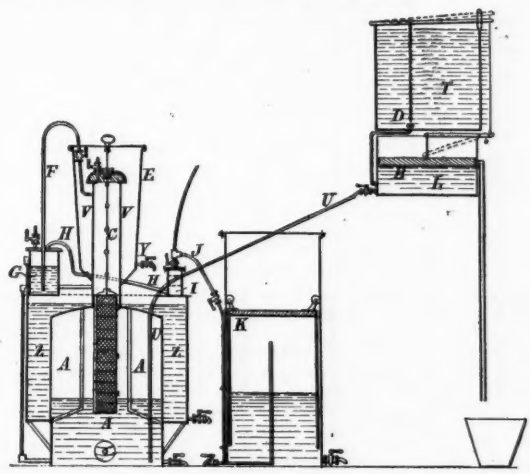
**Bunsen Burners.**—Marshall, H., of Edinburgh. No. 238; Jan. 5, 1897.

This invention has for its object to so construct bunsen burners as to prevent obstruction of the gas-inlets by matters falling into the tubes in which the gas and air are mixed. It is applicable to various kinds of bunsen burners—including those used in chemical laboratories and for incandescent gas-burners.

The air or mixing tube is open completely through; while the gas, instead of entering through a nozzle in the centre of the lower part of the tube, is admitted by a small passage formed in the side of the tube, so that its upper end opens into the tube in a direction inclined from the vertical towards the interior of the tube. In this way, the gas and air become well mixed; and if the inlet for the air at the bottom of the tube is of a moderate size, or is adjusted by a valve, no further adjustment is required at that inlet to diminish the air supply when the supply of gas is reduced to even a very small amount.

**Production of Acetylene Gas.**—Quatannens-Moens, R., of Dixmude, and Carreér-Dilger, E., of Bruges, Belgium. No. 12,556; May 20, 1897.

This apparatus for the production of acetylene gas embraces a device for automatically regulating the supply of the water and the production of the gas by means of the pressure in the generator, also a device for purifying and drying the gas, a cooling device, and a reserve gasholder serving to feed the burners during the replacing of the carbide basket.




The generator A is surrounded by a cooling-reservoir Z, to condense the steam produced by the heat due to the chemical reaction. The generator is surmounted by a cylinder V, closed at its upper part, but provided with a cock for regulating the production of the gas, and with a rod C, to which the carbide basket is attached. The cylinder V is surrounded by a conical reservoir E, into which water is poured so as to completely immerse it, and thus indicate its perfect tightness. To the upper part of V there is connected a tube F, to convey the gas produced to a washing reservoir G. The latter has two tubular unions—one communicating with the atmosphere, and the other with a tube H, which terminates in the lower part of a purifier I that contains in its lower end a plug of wadding covered with a layer of powdered sulphate of iron, upon which there is finally placed a layer of chloride of calcium. The purifier is provided with a union, to which there is fitted a pipe having two branches. One of these leads the gas to the burners; the other communicates with the gasholder K, which serves to feed the burners during the operation of replacing the carbide basket.

A pipe U, immersed almost to the bottom of the generator, effects communication between it and a water-reservoir L, placed above it. The water in this tank always retains the same level, whether it comes from the feeding-tank T above, or from the generator—being forced back by the gas produced in the latter apparatus. For this purpose, a float B on the water of the tank L has a rod jointed to a rocking beam pivoted to the upper part of the wall of the tank L, and which is itself connected to a second rod, to which is attached a chain that supports a valve D, which closes the orifice of the feed-tube. When, by the discharge of the water through the pipe U, the plate descends by its own weight, it operates the arrangement of rods in such a manner that, the chain being raised, the valve D will uncover the orifice of the feed-pipe, and a certain quantity of water will flow from the tank T into L. When the floating plate (raised by the water entering in L) reaches its initial level, the chain moves down by its own weight, and the valve D closes the orifice, so as to interrupt the admission of water from the tank T into L. If water is forced back from the generator by the pressure of the gas produced, the float-plate will move up beyond the overflow-hole, and the water in excess will

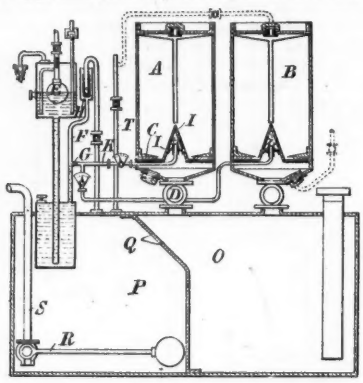
flow away so that the float can resume its initial position, thus always maintaining the same level.

**Incandescence Mantles.**—Kiesewalter, A., of Limburg, Germany. No. 15,963; July 5, 1897.

Mantles for incandescent gas-burners are, according to this patentee, prepared in the following manner: "The oxides applicable for incandescence purposes, together with silicic acid, are brought into igneous flux together with caustic potash or soda, whereby a glassy material is formed similar to the well-known 'water glass,' which is soluble in water. When the material in which is contained the incandescence substance combined in suitable proportions is dissolved in water, suitable organic fabrics are saturated with the watery alkaline solution; and these fabrics are then freed from excess of solution by pressure. The fabrics so treated are then further treated with a suitable acid, or an acid to which a reagent has been added, which precipitates the incandescence bodies, rendering them insoluble both in water and also in the acid employed. By this means, the incandescence material is precipitated in the fabric, while the potash or soda present is converted into other salts. For instance, an alkaline calcium water-glass solution can be treated with sulphuric acid alone, or with oxalic acid and hydrochloric acid mixed, whereby in both cases the corresponding calcium compound will be formed, which compound is insoluble both in water and in excess of the acid present, and in the form of these insoluble compounds will be precipitated in the fibres of the fabric and distributed throughout the same. After the fabric has been thus treated, the resulting soluble salts are washed out by means of water; and the fabric is then applicable for use as an incandescent mantle."

**Generating Acetylene.**—Marks, G. C.; a communication from A. F. Bowers, of Paris. No. 16,975; July 17, 1897.

This invention relates to apparatus for regulating the generation of acetylene by the pressure attained on varying or stopping the admission or contact of water to calcium carbide. The accompanying illustration shows one modification of the invention—the generating plant having a regulator of the type described in patent No. 13,511 of 1896.

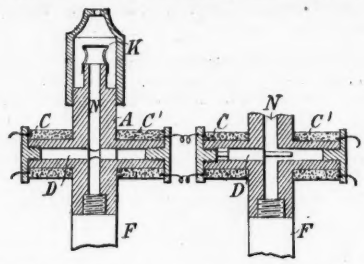



The carbide-holders A and B are similarly constructed. A is composed of a cylindrical casing fitted with top and bottom covers, the latter having a division-plate C carrying a cone, which projects into the cylindrical casing, and is perforated as shown at I. The bottom cover thus forms a separate compartment communicating on one side by way of the cone with the cylindrical casing, and on the other side by way of the cock D with the double compartment tank below. On the carbide-holder B are similar parts. The water and gas regulator is precisely similar in construction and action to that described in the 1896 patent; and it has in addition an automatic ball float-valve E which, when the water reaches a predetermined level in the reservoir, shuts off the initial supply. The water supply to the carbide-holders, after reaching the point G on the pipe F, takes place through small distributing-pipes to their respective holders A B; these distributing-pipes terminating in valve-spaces filled with porous material, all situated within the cones, and having small non-return valves (preferably of the ball type), which allow the admission of the water into the cone and holder while preventing its return. The tank upon which the carbide-holders and regulator stand consists of two compartments O and P, having the carbide-holders discharging by cocks into the former compartment, which in turn communicates with the other compartment, which is furnished with a ball float-valve R, discharge-pipe S, and gas-delivery pipe T.

The operation of the plant is as follows: The carbide-holders are worked alternately. Thus water is sent under pressure from the regulator H (as described in the former patent) to the point G, whence it passes along the pipe K to the upper ring of perforations I, where it meets the calcium carburet packet, into the casing of the holder A. The calcium carburet immediately starts disintegrating; and gas, water, and lime flow out through the bottom ring of perforations I in the cone into the bottom cover, passing by way of the cock D into the tank compartment O, where the lime and water fall to the bottom and the gas passes over into the next compartment P, making its final exit by the pipe T to the place of consumption. The lime and detritus settle to the bottom of the compartment O, whence they are withdrawn at intervals through a sludge-pipe. The water, rising steadily, flows over through the passage Q into the compartment P; being there automatically discharged by the opening of the ball-valve R, allowing the gas pressure to force it up the pipe S. When the gas pressure exceeds a predetermined amount, as it is always in communication with the regulator, the water is forced below G, and the supply to the carbide-holder is stopped.

**Gas-Lighting Apparatus.**—Fritz, F., of Gross-Lichterfelde, near Berlin. No. 18,353; Aug. 6, 1897.

This invention relates to apparatus for electrically lighting gas-flames, and particularly to the part of such apparatus by which the passage of gas from the feed-pipe to the flame is opened and shut through the agency of the current which serves to light the flame.




Two modifications of this are shown. In the first, A is the valve-apparatus, secured to the gas-pipe F, and having a passage N leading to the burner. The means of lighting the flame through the agency of the current are not illustrated, as they are generally known. From the passage N, two side conduits branch off opposite each other. They are closed at the ends, and provided with electro-magnets C and $C^1$, which are connected to contacts of a suitable source of electricity. Within the cross-channel formed by the branch-pipes, a bolt or body D, preferably of cylindrical shape, is arranged to slide with but very slight friction. The bolt is made of a metal attracted by the electro-magnets, so that it will be moved to either side of the cross-channel, as one or the other of the magnets is being energized by the current flowing through it.

In the first modification, the bolt has a circular groove in its periphery, but placed nearer to one end than the other. As the said bolt is attracted by one of the two magnets—say, by C, at the left side—the bolt, being shifted to that side, will place its groove into the path of the gas within the channel N, and thereby allow of the free admission of the gas to the burner. But as soon as the bolt is being shifted to the opposite side, attracted by the magnet $C^1$, the groove of the bolt will be placed out of the channel N, and the bolt will shut the passage, and cut off the flow of gas to the burner.

The second modification consists in omitting the circumferential groove in the cylindrical body, and providing in the ends of it pins or studs of different length. Thus when the bolt is attracted to the side where the shorter pin projects (as illustrated), the channel N of the main-pipe is free for the passage of gas to the burner; but if the bolt is shifted to the opposite side, it will extend across the channel and shut the passage.

The auxiliary device for obtaining a perfectly tight shutting off of the gas is shown in the first view. The upper end of the main-pipe is reduced in diameter; and upon the reduced portion a cap K is arranged to slide, being lifted by the pressure of the gas, as the passage N is being opened, and dropping again by its own weight as the main-passage is shut. The sides of the cap are perforated to allow gas to pass as the cap is raised; but as soon as the cap is down, the perforations are completely closed.

## APPLICATIONS FOR LETTERS PATENT.

22,727.—Dalyell, W., and Howarth, T. E., "Self-lighting lamp." Oct. 4.
22,730.—Flöck, A., "Producing acetylene gas." Oct. 4.
22,755.—Prost, E. A., "Production of acetylene gas." Oct. 4.
22,778.—Jones, W. J. H., "Liquid measuring apparatus." Oct. 5.
22,787.—Smith, W. & J., "Gaslight pendants." Oct. 5.
22,827.—Box, E., "Pipe-joints." Oct. 5.
22,830.—Simpson, S., "Coin-freed meters for gas and other fluids." Oct. 5.
22,850.—Wheatley, W. H, "Lamps for generating and burning acetylene gas." A communication from C. W. Beck. Oct. 5.
22,864.—Goodman, P., "Gas-main stoppers." Oct. 5.
22,912.—Neilson, W. & R., "Acetylene gas motors." Oct. 6.
22,918.—Bailey, C. J., and Nicklin, J. H., "Generation of acetylene gas." Oct. 6.
22,929.—Whitehead, J., and Slater, A., "Generation and storage of acetylene gas." Oct. 6.
22,971.—Leigh, H. H., "Gas and oil motors." A communication from B. J. X. Gosselin. Oct. 6.
23,062-3.—Farmer, D. J. & S., "Gas-governors." Oct. 7.
23,153.—Henry, F. M., "Gas lamps for incandescent lighting." Oct. 8.
23,163.—Desprez, C. P. E., and Duthuit, E. A., "Manufacture of blocks of calcium carbide." Oct. 8.
23,176.—Vickery, W. & G., "Pipe-joints." Oct. 9.
23,198.—Bosshardt, F., "Production of acetylene gas." A communication from A. Molet. Oct. 9.
23,228.—Cooke, J. J., and Cooley, G., "Gas cooking-stoves." Oct. 9.
23,237.—Imray, O., "Enriching gas of low illuminating power." A communication from E. P. & A. Michaelis. Oct. 9.

**The Larne Town Commissioners and the Gas-Works.**—The Larne Town Commissioners had before them last Tuesday the question of the advisability of obtaining a Provisional Order for the lighting of the town either by electricity or by gas. The matter was introduced by Mr. Picken, who remarked that though it might be possible some day for the Commissioners to have both gas and the electric light, he thought the latter was not yet sufficiently advanced for their purpose. He was very far from being satisfied with the light the town was getting at present, from the arc lamps especially; the incandescent lamps not being so bad. For £20,000 they could not fit up electric light works to do the public and private lighting as it ought to be done. He concluded by moving the following resolution: "That this Board take steps to obtain a Provisional Order enabling them to purchase the Larne Gas-Works, also to take in such ground as may be necessary to extend the works to the extent necessary to light the town in a proper and efficient manner." The motion was carried, and a Committee was appointed to employ an expert to value the works.

# CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

### The Scope of the Workmen's Compensation Act, 1897.

SIR,—Though gas-works, as a class of undertaking, do not appear to be specifically included within the operation of the above-named Act, yet the following provisions seem to be applicable to them and to draw them to that extent within its scope. In the Factory and Workshop Act, 1878, section 93, the expression "factory" is defined to mean (*inter alia*) "any premises wherein . . . any manual labour is exercised by way of trade . . . in or incidental to the making of any article, . . . and wherein . . . steam, water, or other mechanical power is used in aid of the manufacturing process carried on there." Thus, a house of machine-charged retorts would appear to be within the scope of the Act, while a house of hand-charged retorts would be outside it. The employment of machinery appears to be the key which opens the works to the domination of the Act.

H. D. ELLIS.

*Commercial Gas Company, Stepney, E., Oct.* 13, 1897.

### The Distribution of Gas.

SIR,—In an article published under the above heading in the last number of the "JOURNAL," Mr. D. Coats Niven, of Calcutta, criticizes severely a paper of mine read at the last meeting of The Gas Institute (*ante*, p. 102), and, in addition, misrepresents, misquotes, and vilifies myself. All this is pleasant. If Mr. Niven enjoys it, I can assure him I am flattered at having excited so much emotion in so calm a philosopher. Because I use the expression "a fallacy exists in some quarters," this is charging "a number of gas managers" with being "ignorant." I call this misrepresentation. He is in the habit of falling back upon logic, so he tells your readers. Then he will have no difficulty in showing how he can predicate "a number of gas managers" of the phrase "some quarters." Have none but the "ignorant" ever entertained fallacies?

As to misquotation, he omits one-half of the entire paragraph which he first refers to, passing on to the next. The mutilated paragraph misquoted by him runs as follows:—

With reference to the replacing of one main by another of larger diameter, a fallacy exists in some quarters that the supplying capacities of the mains vary as the squares of their diameters. As a matter of fact, the capacity variation is as the square root of the fifth power of the diameter, expressed by the formula: Relative discharging capacity of pipes $= \sqrt{d^5}$.

The full paragraph as given in the published text of my paper reads as follows:—

With reference to the replacing of one main by another of larger diameter, a fallacy exists in some quarters that the supplying capacities of the mains vary as the squares of their diameters. As a matter of fact, the capacity variation is as the square root of the fifth power of the diameter, expressed by the formula: Relative discharging capacity of pipes $= \sqrt{d^5}$; *where* '$d$' = *the diameter in feet or decimal parts of a foot. This formula is founded upon the principle common to mathematics and physics—to theory and to experience—that the volume of fluid delivered by a pipe is equal to the product of the sectional area of the pipe multiplied by the mean velocity of flow. In its results, the formula is in close correspondence with the figures given in Barlow's and Newbigging's tables in the second volume of "King's Treatise on Coal Gas" (calculated from Pole's formula), p.* 382.

I have marked in italics the portion omitted by Mr. Niven.

Mr. Niven then wilfully misquotes me. We shall now see why. He wanted to find fault with the paper—this is evident; and his best points would be lost if he let the truth be known. He charges me with ignorance of Pole's essay, and tenders me certain mawkish advice, given in his own clumsy way, immediately after he has suppressed my reference to Pole. Trained engineers, physicists, and mathematicians can see at a glance that I describe the origin of the formula in the suppressed passage correctly, and that of necessity it must be included—that is, folded or wrapped up, so to speak—in any other algebraic expressions formulating the relations of volume, velocity, and sectional area. I only claim that it has the merit of accuracy and simplicity. Mr. Niven is good enough not to deny the accuracy, but he impugns the simplicity. He thinks he would want a clerk to aid him in making the calculations. There I agree with him. I only judge by the sample of his method of calculation which he has given, which entirely ignores the use of such elementary aid as that of logarithms.

I have no more time to waste upon Mr. Niven; but as he has no doubt a high opinion of his own wisdom, I will respectfully request him to study carefully the passage in his letter where he asserts that logic "destroys all rambling or irrelevancy." This may help him. He also states that he performs all his calculations mentally. If his compositions (unless his present frame of mind alters) also in future get no farther than the "mental" stage, it is possible that he may be sensibly benefited, but quite certain that the rest of the world will lose nothing.

THOMAS CANNING.

*Newport (Mon.), Oct.* 14, 1897.

### Stevenson's Regenerator Settings.

SIR,—In your issue for the 12th inst., I notice a patent specification of Mr. G. E. Stevenson, of Manchester, describing a vertical division-tile for building the regenerators of gas-retort settings; and as you give an illustration thereof, many of your readers will recognize the tile referred to as being precisely the same as that used and forming part of Mr. G. R. Hislop's patent regenerative settings. The small check on the under side of the covering-tiles is the only deviation; but this the patentee has found unnecessary.

R. F. HISLOP, Agent for the Patentee.

*Paisley, Oct.* 15, 1897.

SIR,—In the last number of the "JOURNAL" I notice that the "Register of Patents" contains one by Mr. G. E. Stevenson, of Manchester, for "Gas-retort settings and regenerator furnace for same." The system as shown therein is, to all intents and purposes, like that of Mr. Winstanley, which has been used by him for years, and of which I am the erector. Further, some time ago, settings were erected on this system at the Droylesden works of the Manchester Corporation. With regard to the first paragraph of the article, nothing in the arrangement as stated there is new. That which Mr. Stevenson claims—the firing-hole being put in the crown of the arch—has always been done in the Winstanley and other systems; and in the covering-tiles for the air and gas flues the same idea has been carried out, but in a much more efficient manner.

G. NEWMAN.

*Fenton, Oct.* 16, 1897.

# LEGAL INTELLIGENCE.

### Thefts from Prepayment Gas-Meters.

At the Lambeth Police Court last Tuesday, Henry Pagett was charged on remand with breaking into the premises No. 56, Landcroft Road, East Dulwich, and stealing money from an automatic prepayment gas-meter. The circumstances under which the accused was arrested were reported last week (p. 799). It having been stated by Detective Haigh that Pagett had previously been sentenced to 18 months' hard labour for conspiracy and larceny, he was committed for trial.

### Mortgagees' Liabilities for Arrears of Water-Rates.

At the Lord Mayor's Court last Tuesday, the case of the *East London Water-Works Company v. Saunders* was one involving important questions affecting water companies and mortgagees or purchasers. It was an action brought to recover £38 16s. 3d.; being five quarters' water-rates due in respect of certain model dwellings known as Craven Buildings, Bethnal Green, for which it was contended that the defendant, as mortgagee in possession, was liable. Mr. Lewis Glyn appeared for the Company; Mr. Wildey Wright represented the defendant. It appeared that the latter was a lady living near West Drayton, who had taken a mortgage on the dwellings in question in 1892. In March, 1897, the mortgagor had given notice to the collector of the rents to pay them to the defendant "as mortgagee;" and, as a matter of fact, she had received from the mortgagor certain sums amounting to £15, though the notice had not been acted upon by the collector. For the Company, it was urged that the receipt of rents constituted the defendant the mortgagee in possession, and as such rendered her liable for the rates under the Water Companies Regulation of Powers Act, which made arrears recoverable "from the owner or from the occupier for the time being." Further, it was said that she was liable under the same Act for simply "receiving the rents;" thereby bringing herself within one definition of "owner." It was admitted to be a serious point; but Counsel said that mortgagees must satisfy themselves that all water-rate arrears had been or were being satisfied. The defence was that the collector did not act upon the written notice; and that the defendant was never the owner for the time being, as the mortgagor had continued to receive the rents until now, and the £15 paid to the defendant was money handed over to her in pursuance of a separate verbal agreement. The jury found for the plaintiffs for the amount claimed, with costs.

**Additional Borrowing Powers for the Heywood Corporation Gas Department.**—It was reported at the meeting of the Heywood Corporation last Thursday that the Local Government Board had granted a Provisional Order to enable the Gas Committee to borrow £20,000 for the purposes of the department.

**Public Lighting of St. Pancras.**—Last Wednesday, the St. Pancras Vestry levied a lighting-rate of 1½d. in the pound, which is estimated to produce £9810. The sum required, however, is £12,033; and the odd £2000 is presumably to be made up from the next half-year's "profit" from the electric light undertaking. It is satisfactory to note that gas is not quite pushed out by the new illuminant; for no less than £5300 is set aside for it, while but £2800 will be necessary for the public electric arc lamps.

**Proposed Purchase of the Farnworth Gas-Works by Local Authorities.**—At the last monthly meeting of the Farnworth District Council, a motion was submitted that a Special Committee be appointed to confer with other districts interested as to the advisability of negotiating for the purchase of the undertaking of the Farnworth and Kearsley Gas Company. The matter was referred to the General Purposes Committee. The authorities concerned are the Farnworth, Kearsley, and Little Hulton District Councils; and quite recently a deputation representing them waited upon the Directors of the Company with the view of securing a reduction in the price of gas. So far, however, the movement has not been attended with success, though the Directors have promised to lower the price when circumstances warrant this step. The present charge is 3s. per 1000 cubic feet to cottagers.

**Hobart Gas Company.**—At the last half-yearly meeting of this Company, the Directors reported a balance of £5110 standing to the credit of the profit and loss account for the six months ending June 30, out of which they recommended a dividend of 16s. per share. This would amount to £4400; the allowance for dividend tax would come to £220; and £490 would be carried forward. Acting upon a resolution come to at a previous meeting, the Directors have arranged to erect electric lighting plant of sufficient capacity to supply any probable customers who prefer this system of illumination. The Chairman (Mr. G. Crisp), in moving the adoption of the report, stated that the sales of gas had been 24,716,900 cubic feet, as compared with 26,955,300 cubic feet in the first half of 1896. There was a good demand for residuals, especially coke; every ton made commanding a ready sale. Though the dividend was low in comparison with that paid by some gas companies in Australia and New Zealand, other colonies were fortunate in having no duty whatever to pay on the raw material; while in Tasmania the gas industry was weighed down with the crushing impost of 4s. on every ton of coal imported. He hoped, however, the Treasurer and Parliament would soon see their way to reduce the duty, and so permit the Directors to carry out their policy of making a concession to the consumers. The report was adopted.

# MISCELLANEOUS NEWS.

## THE GAS AND WATER ORDERS OF THE PAST SESSION.

The Board of Trade report on their proceedings under the Gas and Water Works Facilities Act, 1870, during the past session, was issued last week. It states that in December, 1896, eighteen applications for Provisional Orders were made to the Board—eight relating to gas, and ten to water undertakings. The amount of capital proposed to be authorized was £399,500 by shares and £102,958 by loans; and of the total amount, £232,500 of share and £59,875 of loan capital related to gas undertakings, and £167,000 of share and £43,083 of loan capital to those for the supply of water.

The applications for Gas Orders were in respect of Cradley Heath, Harrogate, Hoylake and West Kirby, Killamarsh, Market Harborough, Sedbergh, Westbury, and Wimborne Minster; the first three relating to undertakings already authorized by Special Act or Provisional Order. The Cradley Heath Gas Company applied for power to raise additional capital, and to substitute a standard rate with sliding-scale for the existing authorized maximum price and dividends. The Harrogate Gas Company sought to obtain powers for the construction of additional works, and for raising further capital. The Hoylake and West Kirby Gas and Water Company, Limited, applied for authority to raise more capital for the purposes of their gas undertaking, and to consolidate the additional gas and water capital of the Company. One application only—viz., that of the Killamarsh Gas Company—was for authority to construct and maintain new works. The remaining four applications—those relating to Market Harborough, Sedbergh, Westbury, and Wimborne Minster—were for authority to maintain and continue works already existing without parliamentary sanction; and also, in the case of Sedbergh and Wimborne Minster, for power to construct additional works. Objections were lodged against most of the applications. In several cases, meetings were held at the offices of the Board of Trade between the promoters and the opponents, to discuss the objections; and in one case there was a local inquiry. The Board granted an Order in each case, subject to certain modifications and amendments.

In the case of the Wimborne Minster Order, the consents of the local and road authorities interested were not obtained; and the Board of Trade were asked by the promoters to dispense therewith. The Board appointed Lieut.-Col. H. A. Yorke, R.E., to hold a public inquiry at Wimborne, and to report to them on the matter. Upon consideration of his report, the Board decided to grant an Order; and, in accordance with section 4 of the Gas and Water Works Facilities Act, 1870, they made a special report to Parliament setting forth the facts. The terms of the report were given in the "JOURNAL" for June 1 last (p. 1255).

The sliding-scale of price and dividend was adopted in the Cradley Heath and Wimborne Minster Orders. In the former Order, the initial price per 1000 cubic feet was fixed at 3s. 2d. for reduction, and 3s. 1d. for increase of dividend. The initial price in the latter Order was fixed at 4s. 1d. per 1000 cubic feet. In the following Orders, a maximum price was fixed; power being reserved to the Board to vary it or to substitute a sliding-scale after three years: Killamarsh, 5s.; Market Harborough, 3s. 4d.; Sedbergh, 5s. 10d.; Westbury, 4s. 4d. In the Sedbergh Order, the minimum illuminating power of the gas was fixed at 16 candles. In other Orders, the usual minimum of 15 candles was prescribed where necessary.

The supply of gas in bulk beyond the boundary, subject to the usual limitations, was authorized in the Cradley Heath, Harrogate, Killamarsh, Westbury, and Wimborne Minster Orders. The Orders also contain the usual clauses as to the sale of additional capital by auction or tender, and limits of dividend, except that the dividend on the original ordinary capital was limited in the Sedbergh Order to 7 per cent., and in the Market Harborough Order to 5½ per cent.; also as to the creation of insurance and reserve funds, the testing of gas, and the quantity of land to be taken by agreement, &c. Where necessary, the Gas-Works Clauses Acts, 1847 and 1871, are incorporated. Provisions were inserted in the Cradley Heath and Harrogate Orders requiring the debenture stock authorized thereby to be offered for sale by auction or tender. Special clauses were inserted in the Cradley Heath and Wimborne Minster Orders as to the supply of gas to the public lamps.

Two Bills to confirm the several Orders were introduced into the House of Lords on the 3rd of May. The Market Harborough Order, which was included in the second Bill, was petitioned against by the Market Harborough Urban District Council; and the Bill was therefore referred to a Select Committee. The Order was, however, withdrawn by the promoters before the Committee was appointed; and both Bills then passed the remaining stages without opposition, and received the Royal Assent on the 6th of August.

The applications for Water Orders were in respect of Barton-upon-Humber, Benfleet District, Bridge of Allan, Frith Hill (with Godalming and Farncombe), Gosport, Newmarket, Royston, South Hayling, Steyning and District, Tendring Hundred and Clacton-on-Sea. The Benfleet and Steyning applications related to new undertakings; the Bridge of Allan and Frith Hill, to extension of works; the Gosport and South Hayling, to extensions of works and limits of supply; the Barton, to a transfer of the undertaking and further powers; the Newmarket, to additional capital only; the Royston, to the maintenance and continuance of an existing undertaking; and the Tendring Hundred, to a new joint undertaking by two existing Companies. In all the cases except South Hayling, power to raise additional capital was sought.

The Benfleet and Tendring Hundred applications were dropped by the promoters; and the Board of Trade declined to proceed with the South Hayling application, as they were not satisfied that the requirements of the Act and Rules had been fully complied with. Orders were made in the other seven cases, with such amendments in detail (including rates and charges) as were needed to satisfy reasonable objections, or to protect the interests of consumers. In no case was the consent of a local or road authority dispensed with; nor was it found necessary to hold any local inquiry. In the case of the Barton-upon-Humber application, instead of sanctioning a transfer of the undertaking, as proposed, and a revival of the powers contained in the Order of 1885, which had virtually lapsed, the Board granted a maintenance and continuance Order, in the latest form, with reduced charges, and revoked the previous Order. The local and road authorities approved of the new form, with such amendments as had been made to meet their requirements.

A Bill to confirm the Water Orders was introduced in the House of Lords on the 3rd of May. It passed through both Houses without opposition, and received the Royal Assent on the 6th of August.

The total number of Orders made by the Board since the passing of the Act is 428, of which 420 have been confirmed by Parliament.

## THE HULL CORPORATION AND THE KINGSTON-UPON-HULL GAS-WORKS.

### Local Government Board Inquiry.

Last Friday, Colonel W. L. COKE, one of the Inspectors of the Local Government Board, held an inquiry into the application by the City Council for sanction, under section 71 of the Kingston-upon-Hull Incorporation Act, 1897, to an agreement for the purchase of the undertaking of the Kingston-upon-Hull Gas Company.

The TOWN CLERK (Mr. E. Laverack), in support of the application, first dealt with the apparent anomaly that, though the scheme had been sanctioned by Parliament, provision was made that it should not be carried into effect without the sanction of the Local Government Board. This provision, he said, was inserted expressly to meet the objections of a minority of the ratepayers, who had demanded a poll, but withdrew it when they were given an assurance that they should have an opportunity of stating their views at a Local Government Board inquiry. As to the position of the gas supply, three Companies served Hull—viz., the Kingston-upon-Hull Company, the British Gaslight Company, and the Sutton, Southcoates, and Drypool Company. The Kingston Company enjoyed exceptional privileges as compared with the other two concerns. There was no limit to the dividend they could pay, nor to the price they could charge for gas; and they were not restricted by the Gas-Works Clauses Act. Ever since 1875, communications had been going on between the Company and the Corporation as to the purchase of the undertaking; but not until October last year were terms arrived at. The price then agreed upon was £92,500, which sum was based on the profits. The undertaking was regarded by the Corporation as a good one commercially. The profits last year were £4976. The average yearly profits from 1877-81 were £2541; from 1882-6, £3251; from 1887-91, £3770; from 1892-6, £4035—in spite of having in the latter part of the time been subject to the competition of the electric light. The purchase was really part of the scheme by which they hoped to dismantle the works altogether. They had reason to believe they could make an arrangement with one or other of the existing Companies to supply gas in bulk at 1s. 6d. per 1000 cubic feet. The site was in the heart of the business part of the town; and the place was not at all adapted for the manufacture of gas. Numerous complaints had been made to the Company regarding nuisances; and no doubt they had done the best they could to abate them. But the scheme, if sanctioned, would result in street improvement of very great importance, towards the carrying out of which the North-Eastern Railway Company had bound themselves to sell a portion of their land adjoining the Gas Company's area. The Corporation proposed to borrow the purchase money; and the borrowing powers were already provided for by Act of Parliament.

Mr. W. AUSTIN said that, as a ratepayer, he attended the statutory meeting and demanded a poll; but upon the strength of an assurance that further opportunity would be given for considering the matter, he withdrew the demand. He presumed the promoters of the scheme were prepared with the best expert evidence that could be called as to the actual value of the works as a going concern. Mr. Laverack had stated that the price was based upon 18 years' purchase; but they were without information to guide them in arriving at a fair estimate.

The INSPECTOR inquired the amount of the original capital.

The TOWN CLERK replied that the original share capital was £17,000 nominally in shares of £25 each. The actual share capital subscribed was 600 shares, upon each of which £22 10s. had been paid; making a total of £13,500. The Company had borrowing powers to the extent of £4250, which they had exhausted, so that the share and loan capital was £17,750. It was only fair to say that this did not represent anything like the capital expended, because many large sums had been spent out of profits on the works.

Mr. AUSTIN said the last transfer of shares was at £92 on £22 10s. paid up; but, as a matter of fact, the price proposed to be paid by the Corporation was £160.

The TOWN CLERK corrected Mr. Austin's statement that the Corporation were paying £160 per share. It amounted, he said, to £150.

Alderman *Massey* gave evidence with reference to the negotiations for the purchase of the undertaking, and the necessity for its extinction.

Questioned by Mr. AUSTIN, witness said the exact area that would be acquired was 4353 square yards. He thought the Corporation were making a very good bargain in the interests of the ratepayers. He had reason to believe that arrangements could be made by which the other Gas Companies would supply the old town with gas. Before they practically concluded the agreement, one of the Companies offered to supply them in bulk at 1s. 6d. per 1000 cubic feet. The present price charged by the Kingston Company was 3s., without any restriction as to illuminating power, quality, or dividend. If the agreement were sanctioned, the Corporation proposed to supply gas at 2s. 8d. Assuming that they had to pay 3 per cent. for the purchase money, the profits would enable them to pay off the principal and interest in 50 years, at the end of which period they would have the whole of the area of the Company's land as a free asset.

Mr. *T. Johnson*, Accountant to the Company, gave evidence as to the profits and other matters.

Mr. *F. J. Bancroft*, the Corporation Water Engineer, gave evidence to show that the price agreed to be paid for the undertaking was a fair one as compared with the sums paid in other gas-works transfers in recent years.

Mr. *F. A. Scott* said the Company saw very clearly that they had not a suitable site for their works; and therefore they lent a willing ear to

the Corporation. As to the distribution system, the rule of the Company had been during the last twenty years that, whenever a street was taken up by the Corporation for other purposes, the mains were examined and relaid if required.

Mr. *T. Newbigging* stated that the works were not altogether modern in every department, but were in fair condition, and able to earn and maintain the profit shown on the balance-sheet. As to the £92,500 which it was proposed to pay for the property, he should not have accepted it had he been consulted as to the value. Considering the site, the Company were justified in selling; but they were exhibiting a self-sacrificing spirit in consenting to accept £92,500.

Mr. AUSTIN submitted that there had not been a single person called who was capable of making a proper valuation of the works on behalf of the Corporation; while on the other side the best of expert evidence had been obtained to assist the Company. This seemed to him a most unbusinesslike proceeding.

The INSPECTOR: You have had the evidence of Mr. Newbigging.

Mr. AUSTIN pointed out that Mr. Newbigging was called by the sellers. There was, he declared, a widespread feeling in the city that the price which the Corporation proposed to give was excessive; and he suggested that, assuming the Local Government Board were satisfied as to the wisdom of the purchase, they should send down an independent valuer. For this reason, he urged that there should either be a new inquiry or an adjournment.

The INSPECTOR said he had power to adjourn, but not to promise a new inquiry; and it was not the practice of the Local Government Board to order an independent valuation.

Mr. AUSTIN replied that the Inspector might suggest it, and that pending the valuation the inquiry ought to be adjourned.

The TOWN CLERK said it must be almost shocking to the legal mind of his friend Mr. Austin when he thought that the opposition had come there without a single scrap of evidence in support of their case. There could be no question as to the wisdom and soundness of the bargain made by the Corporation. They were going to give £92,500 for an undertaking which had been valued by Mr. Newbigging at £115,000. It would be a great calamity to the city were sanction to the agreement refused. It would impede the carrying out of a great improvement, and would cause a serious loss to the city.

In closing the inquiry the Inspector announced that he would visit the Company's works the following morning.

## THE PUBLIC LIGHTING OF COVENTRY.

### Electric v. Incandescent Gas-Lights.

At the last Meeting of the Coventry City Council, schemes for the better lighting of the city were under discussion. Mr. West proposed a resolution sanctioning the expenditure of £2000 in installing electric light lamps in lieu of gas in certain streets. This scheme met with opposition a few weeks ago; but the then objecting members now supported it. The Chairman of the Gas Committee (Alderman Andrews) pointed out that the proposal meant this—that Coventry having lost £1700 last year in supplying private consumers with electricity, ought now to lose another £800 per annum in providing forty arc lights. The proposition was, however, carried. The Gas Committee reported that they had been experimenting with incandescent burners, suspended by an anti-vibration attachment, for the public lighting; and the result was quite satisfactory. The Committee were prepared to substitute incandescent mantles and fittings for the present burners in the public lamps, or any number of them which might be decided upon. The charge at present made to the Council for an ordinary single burner lamp was £2 11s. 7d. per annum, which included erecting, lighting and extinguishing, cleaning, and maintenance. Larger lamps were charged for at a higher rate. The Committee were prepared to provide, maintain, clean, light, and extinguish lamps on the incandescent system at the following rates per annum: Single-mantle lamps, £2 11s. 7d.; two-mantle lamps, £4 9s. 8d.; three-mantle lamps, £6 4s. 6d. Alderman Andrews, in moving the adoption of the report, said the Committee found the incandescent system of lighting less costly than the ordinary method, and they were prepared to take the orders or instructions of the Council to put mantles in other streets at the prices mentioned in the report. The figures were put down at cost price. The gas was reckoned at 2s. per 1000 cubic feet; the method by which this figure was arrived at being something like this: The average price at which gas was sold last year was 2s. 3½d., and the £6200 of clear surplus profit was equal to 3½d. per 1000 feet. Deducting one figure from the other, left 2s. as the net cost, covering all charges. In the gas undertaking there was no hair-splitting between running expenses and interest on capital and sinking fund. These charges were taken as part and parcel of the cost of making gas. Mr. Drinkwater seconded the motion. Alderman Hill said Alderman Andrews's inquiries as to the lasting qualities of incandescent gas-mantles did not correspond with those made in other towns. The Town Clerk of Douglas had investigated this matter, with the result that 28 towns gave a verdict favourable to the incandescent burner, and 36 replied unfavourably. Of the 184 towns inquired about, 63 were trying experiments; and several had great doubts about satisfying the authorities. Alderman Andrews's experience might, however, be different. The Mayor (Alderman Tomson) inquired how recent was Alderman Hill's information. Alderman Hill said it was obtained in May of this year. The Mayor said that since May many improvements had been made. Coventry had tried the lights, and the Gas Committee were acting not so much on other people's experience as their own. Mr. Robinson supported the motion. He said Coventry had not been well lighted for many years, but there was now a prospect of great improvement. He inquired what was the consumption of gas by incandescent burners. Alderman Andrews replied that it was 4 cubic feet per hour. He added that experiments for twelve months with incandescent burners had been unsatisfactory; but with the anti-vibration arrangement there had only been one or two mantles broken; so that the difficulty with the mantles had been overcome. The report was adopted. The Mayor said it would now be for the Street Lamp Committee to specify what lamps would require altering. He had no doubt they would do so, and soon give the Gas Committee a very large order.

## THE WORKING OF THE PENNY-IN-THE-SLOT SYSTEM IN SOUTH LONDON.

It cannot be said that the general public are kept in ignorance of the capabilities of gas and the best means of using it, owing to the unwillingness of those who are best qualified to speak on these matters to disseminate their information through the now ubiquitous "interviewer." Only recently, Mr. George Livesey assisted one in making "copy" for the "Daily News," and at the same time gave gas consumers some good advice as to the use of incandescent burners. And a few days ago Mr. Frank Livesey gave to a representative of the "Daily Mail" an idea of the magnitude of the "penny-in-the-slot" gas business in the South Metropolitan Company's district. "The introduction of meters on this principle," says the writer, "has been attended by results that verge on the marvellous; as much as 10 tons weight in coppers having been removed from them in one collection. When the Directors decided on introducing the slot machines, they resolved to furnish the necessary fittings in addition to a gas-stove, wherever it seemed desirable. The cost of providing these facilities amounted to £6 per house; and to cover this outlay, the Company charge an extra 10d. per 1000 cubic feet of gas to coin-meter consumers. The effect of the almighty penny on the Company's revenue may be gathered from the fact that these consumers number 61,000, and that the average takings from each are £3 per annum. The limit, however, has not been reached, since from 200 to 300 of these meters are being fitted up weekly; and by Christmas the Company's total receipts from this source will be equivalent to £200,000 a year." The writer goes on to show what a revolution has been worked in the conditions of gas supply by the new system. "Prior to the introduction of the coin-meter, Sunday was an extremely slack day for gas. But now, Mr. Livesey declares, the demand between twelve and two o'clock, when thousands of dinners are being cooked on the gas-stoves, is enormous—so great, in fact, that at times it has been a problem to get sufficient gas through the mains to meet the demands of the exigent housewives who are superintending the baking of the family joint. Another excellent result from the Company's point of view has been the equalizing of the summer and winter consumption. Formerly there was a great disparity; but the consumption of gas for cooking in the summer months has worked a marked change. Under the slot system, the consumer can obtain 27½ cubic feet of gas for 1d. An ordinary burner consumes about 5½ cubic feet of gas per hour; so that a penny-worth of gas will light up a room for just 5½ hours." Having referred to the device introduced into the modern meters for preventing the withdrawal of a coin after it had been dropped in, the writer shows that it is out of the question for the evil-disposed to effectively cheat a penny-in-the-slot machine which is put up in their own abode by means of discs of metal or spurious coins, since the imposition is detected the first time the collector calls, and restitution is promptly demanded. But, as a matter of fact, the Company's collectors declare that they have scarcely any trouble. They are on the best of terms with their customers, and the dishonest are few. Frequently when no penny is at hand the consumers will use a token, or a 2s. piece, and when the collector calls they will tell him of the fact, and hand over the pennies, or receive change, as the case may be. The collections are made at intervals of about three weeks; and there has been at times an actual dearth of copper money in South London, owing to the fact that a sum of £10,000 in pennies has been locked up in the Company's coin-meters. Since this method of supply was introduced, the officials assert that they have not lost more than a dozen of their coin-meter consumers—a striking testimony to the popularity of the penny-in-the-slot system.

**Holyhead Water-Works Purchase Question.**—The poll of the ratepayers on the resolution passed by the Holyhead District Council to promote a Bill in Parliament to authorize them to purchase the Holyhead Water Company's undertaking, has resulted in a majority of 558 against the scheme. The number of ratepayers entitled to vote was 2300, and 1176 filled in their papers.

**The Rochdale Town Council and the Purchase of the Todmorden Water-Works.**—Last Wednesday, the Rochdale Town Council considered in Committee the recommendation of the Water Committee that they should purchase the Todmorden Water Company's large reservoir in the Ramsden Valley, and all the rights connected therewith, at the price asked by the Company. The gathering-ground—chiefly moorland—covers about 950 acres in the neighbourhood of Todmorden. Mr. James Mansergh, M.Inst.C.E., has lately been examining the Rochdale reservoirs, and inspecting the gathering-ground; and he is of opinion that if the consumption of water continues to increase as it has done of late, in three or four years a further supply will have to be obtained. The Council passed a resolution almost unanimously to accept the offer of the Company; the purchase-money to be in the shape of annuities. The Todmorden Town Council have already decided to promote a Bill in Parliament to try to secure the reservoir in the Ramsden Valley and the gathering-ground.

**Fylde Water Company.**—The half-yearly report of the Directors of this Company states that the fresh expenditure on capital account has been £26,731, which makes the total outlay £409,280. The water-rates and other receipts amounted to £18,628. The interest on loans and bank commission came to £950; and the working expenses, rents, rates, and taxes, to £3872—leaving a balance of £13,806, which, with the sum of £8753 brought from the last account, makes a total of £22,559. The Directors recommend a dividend at the rate of 4 per cent. per annum on the preference stock, 10 per cent. on stock "A," and 7 per cent. on stock "B," all less income-tax. After paying these, £12,457 will remain. With reference to the pending arbitration respecting the transfer of the Company's works to the Local Authorities—in terms of the Act of Parliament passed last session, and abstracted elsewhere to-day—it is generally expected that an amicable arrangement will be come to. A Joint Committee of the authorities has been formed, with Alderman Bickerstaffe, of Blackpool, as Chairman. Until the transfer is completed, Mr. T. Loftus, the Town Clerk of Blackpool, will act as Clerk; and Mr. Tyldesley, the Clerk of the Fleetwood District Council, as Accountant. All the old officials are being retained by the Joint Board.

## ELECTRIC LIGHTING NOTES.

The Electric Lighting Committee of the York City Council have agreed to advise the latter to accept tenders for electric lighting works, as recommended by Professor Kennedy, and to apply for leave to borrow £20,000 for the installation.

The Morecambe District Council have received the sanction of the Local Government Board to the borrowing of £22,100 for the erection of electric lighting works, and £3900 for the purchase of a portion of the undertaking of the old Electric Light Company. The Lighting Committee now find that everything was not taken into consideration in making the estimates; and they have asked the Council for an additional £7000.

Since the Corporation acquired the electric light undertaking at Exeter, more life has been infused into the management, and there has been considerable improvement all round. The result is that what was a loss has become a profit; and the Corporation are already congratulating themselves upon the prospect of reaping a handsome revenue from the works. According to an informal statement laid before the City Council last Wednesday, the receipts for the year to Midsummer were £3535, and the expenditure £2306; showing a gross profit of £1229. After deducting the amount required for interest and the sinking fund, there is a net profit of £230—a result with which he thought the citizens might be satisfied. The Town Clerk added that the gross revenue was about £800 in excess of that of the Electric Light Company the previous year.

Action is being taken by the Darlington Corporation to obtain the views of the leading ratepayers, and those who would be likely to require the electric light, on the question of introducing this system of lighting into the town. The matter has been considered at various times for some years; and the Town Council obtained a Provisional Order to supply electricity, but nothing in that direction has yet been done. Before establishing an installation, a circular has been sent out in order to ascertain the likely extent of the demand. The circular states that the outlay on an installation for the borough would be about £25,000, and that the cost of lighting by electricity would be about equal to the cost of the gas now consumed if it was charged at 3s. per 1000 cubic feet net, instead of 2s. as at present. If it should be decided to introduce electric lighting, gas would be displaced in the main streets of the town.

A special meeting of the Shrewsbury Town Council was held on Monday last week, to receive a report from the Finance Committee on the electric lighting question. It stated that the Town Clerk had entered into negotiations with the Shropshire Electric Light Company with the view to the purchase of their undertaking by the Corporation, and that a letter had been received from their Solicitors to the effect that the Directors had considered the offer for the acquisition of the works, &c., for the sum of £21,500, and had agreed to accept it. At present only a provisional contract can be entered into, as the sanction of the Local Government Board must be obtained before the matter can be settled; and April 1 next was suggested as the date. The Council unanimously approved of the proposed purchase; and it was agreed to take steps to borrow £35,000 to complete it, and extend the works and cables.

Though the Directors of the Reading Electric Supply Company, Limited, in their report for the year ending Dec. 31, 1896, express much satisfaction at the rate at which the business has progressed during the past three years—the number of consumers having risen from 38 at the close of 1894 to 154 at the end of 1896, and that of lamps wired from 2150 to 8700, with the addition of 2712 since applied for—the shareholders probably regard with a different feeling the accounts accompanying the report. The total revenue last year was £2133; and the expenditure, £2095—leaving a balance of £38 to be carried to the net revenue account. This amount, with a credit balance of £19 standing on Dec. 31, 1895, and £13 received during the year for interest, made up £70, which was insufficient to meet the charge for interest on the Company's overdraft at the bank; and the net revenue account had at the close of the year a debit balance of £76. The expenditure on capital account amounted then to £35,212; but as only £34,805 had been raised, there was a deficiency of £407. This has since been met by the issue of £10,000 in debentures.

Some extension of the electric lighting plant of the Southport Corporation being required, the Electricity Committee decided to ask the Council to sanction an application to the Local Government Board for power to raise £5000 for the purpose. On further consideration of the matter, however, they determined to make the sum £21,178; and this proposition came before the Council last Tuesday. Mr. Hesford explained that the borrowing powers of the Corporation amounted to £58,822, and if the proposal was agreed to, they would be, in round figures, £80,000. The expenditure up to the present time had been £58,315; so that they had exhausted their powers to within £507. He thought the Committee would be able to convince the Council of the absolute necessity to obtain so large a sum as that named. The £21,000 was needed for an anticipated order for lights to the number of 18,000, which would mean double the plant they had installed or were now installing. The amount, he might say, also took into consideration the laying of two or more mains. The Committee were advised that the existing mains were coming practically to the limit of their carrying capacity, and that it would be advisable to put down more. If the Council agreed to the application—and he felt sure they would do so—the Committee would not, of course, attempt to spend any portion of the amount at once. Before any contract was entered into, the details would have to be submitted to the Council. Their lamp connection was extending by leaps and bounds; and every additional yard of cable laid increased the ratio of the connection. The consumption by private consumers increased by 114 per cent. last year. The Committee's amended proposal was agreed to.

**The Newhaven and Seaford Water Company and the Local Authorities.** - The District Councils of Newhaven and Seaford met last Wednesday in order to confirm the proceedings of the Joint Committee who have been considering the question of purchasing the local Water Company's property, and who recommended that a Bill be introduced in Parliament next session to acquire the undertaking. At the meetings of both bodies, similar resolutions were passed, declaring that it was expedient to obtain the necessary powers for the compulsory sale and purchase of the works, and agreeing to take steps for the promotion of the Bill.

## THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

### The Typhoid Fever Scare—An Inquiry Ordered.

At the Meeting of the London County Council last Tuesday (Dr. Collins in the chair), Mr. Cornwall moved—"That it be referred to the Public Health and Water Committees to inquire and report whether the causes which have led to the typhoid fever epidemic in Maidstone have any parallel in the conditions of the London Water Supply, and what steps, if any, should be taken to prevent the propagation of the disease in London." He said it was the Council's duty to very carefully inquire into the causes of the sad calamity in Maidstone, and to see whether any like conditions prevailed in reference to the water sent out for consumption in London. He hardly cared to consider what would happen to London if typhoid fever were to break out at Reading, or at any town along the Thames. He hoped that if ever such an epidemic as that of Maidstone were to occur in London, it would never be brought home to the Council that they had neglected their duty. He therefore thought that the present was the opportune time for them to thoroughly investigate the whole matter. He did not dispute that the London water was day by day fairly fit for drinking; but London was running the risk that at some time or other its people might get such a dose of bacilli that, instead of being enabled to digest them, they might kill the people. Mr. Idris seconded the resolution; and observed that for some years he had been satisfied that London had been running a greater danger than could have been supposed to exist in Maidstone. As a member of the Thames Conservancy, he knew that both the Thames and the Lea were being constantly polluted. In the case of Hertford, where it was maintained they had a right to pollute the water, a foul ditch had been running into the water which was supplied to the East-end of London; and the only way they could prevent it was by buying up the right of the authorities to use the ditch. Another serious source of pollution by sewage was at Maidenhead; the Thames Conservancy inspector having reported that the condition of the water was very unsatisfactory, and described the pollution as of long standing. It was difficult to get the River Purification Committee of the Conservancy to take action, because it consisted largely of members who were interested in land in the Thames Valley, who thought it unjust that they should be compelled to pay for the purification of the effluents in order to provide drinking water for London. Dr. Forman said the Public Health Committee had been watching the course of the Maidstone epidemic; but they had not noticed any rise in the number of typhoid cases in London. Dr. Longstaff denied that there was any parallel between London and Maidstone. He deprecated the attempts which were being made by some papers to raise a panic in London; and he was glad that they had so far signally failed. There was less danger of an epidemic in London from Thames water than there would be if the supply were wholly dependent on a Welsh conduit. Mr. Boulnois, M.P., expressed surprise at the attack which Mr. Idris had made upon the Thames Conservancy, who were responsible for preserving the river from pollution. He thought these remarks might create unnecessary alarm. The London Water Companies were getting used to inquiries, and they welcomed another, believing that the report would go further to assure the people that the water supply was pure. Sir A. Arnold supported the motion; and in the result it was unanimously agreed to.

## THE EPIDEMIC OF TYPHOID FEVER AT MAIDSTONE.

The epidemic of typhoid fever at Maidstone, to which reference was made in the last two issues of the "JOURNAL," did not, unfortunately, show marked signs of abatement during the past week. On Saturday the number of cases reported had risen to 1623, and the deaths to 96. In an official notification published on Tuesday, the Water Company stated that they were doing their utmost to meet the emergency. The pipes were being laid to connect their mains at Cossington with those of the Mid-Kent Water Company at Eccles; and they had no doubt the work would shortly be completed—the distance between the mains of the two Companies being only a mile. Directly the connection is established, they will have a further supply of 100,000 gallons per day to meet the requirements of the town. The Directors have had the Mid-Kent Company's water bacteriologically analyzed by Dr. Washbourn, who has pronounced it to be quite satisfactory. They have called to their assistance Dr. Sims Woodhead, an eminent bacteriological analyst, who has been instructed to report as to what steps should be taken in the future.

At the meeting of the District Council on Wednesday, the Medical Officer of Health (Mr. M. A. Adams) reported on the progress of the disease. He said he was thankful to announce that there was abundant evidence that the crisis had passed; that a rapid decline was taking place; and that the extinction of the epidemic, which was unexampled in this country for its magnitude, was in view. He had discussed with Dr. Woodhead and others the advisability of disinfecting the Company's mains and reservoirs; and they were practically agreed that there was no risk of infection incurred by the Cossington water passing through the mains within the area of the town formerly supplied with Farleigh water. Nevertheless, as an act of prudence, it was deemed desirable that steps should be taken to set at rest any dread of infection from this cause that might exist; and it was intended on Saturday to thoroughly disinfect the town reservoir and the mains with a solution of chloride of lime. The Company had entrusted Dr. Woodhead with the duty of carrying out this important work. It was thought desirable that the Council should back up Dr. Woodhead by a definite expression of their opinion; and a resolution was passed requesting the Company to disinfect the Farleigh mains and reservoir, and also the house connections. It was also decided to instruct the Sanitary Committee to make weekly analyses of the water.

Notwithstanding assurances given from time to time that the whole of the Farleigh water had been cut off, many of the inhabitants have expressed doubts on the matter. In order to allay these, the Water Company's Manager (Mr. W. J. Ware) last Friday made a statement on oath before a Commissioner, to the effect that no Farleigh water had been pumped up to the Barming reservoir for the use of the inhabitants since

the 29th ult; and this statement was promptly exhibited on the Town Hall doors.

Under the personal supervision of Dr. Woodhead, the reservoir and mains of the Farleigh area of water supply at Maidstone were on Saturday night disinfected with a solution of chloride of lime. About 10 tons of the material were mixed in the reservoir with 200,000 gallons of water; and afterwards the mains throughout the town were charged at full pressure with the solution. At a certain hour, the liquid was allowed to flow through the whole of the house connections in the districts concerned, and eventually the solution left in the mains was got rid of through the various fire hydrants in the streets. The Manager of the Water Company had a large staff of men at his disposal; and credit is due to him for the effective working of all arrangements. The supply of drinking water in the Farleigh area was not to be restored till yesterday morning. Throughout Sunday, water was conveyed round the town by water-carts lent by the military authorities at Woolwich, Chatham, and elsewhere.

## THE PROPOSED NEW WATER SCHEMES FOR CARLISLE.

### Mr. E. M. Eaton's Report.

In the "JOURNAL" for the 5th inst., we briefly noticed a report presented by Mr. E. M. Eaton, Assoc.M.Inst.C.E., to the Water Committee of the Carlisle Corporation, on the three schemes prepared by their Engineer (Mr. C. B. Newton, Assoc.M.Inst.C.E., F.C.S.) for improving the water supply of the city. These schemes were described on Aug. 17 (p. 396); and we are able now to give fuller details of Mr. Eaton's proposals with regard thereto.

Commencing with the existing works, Mr. Eaton states that, in his judgment, the water supply to the city, as now furnished by the Corporation, is altogether behind the requirements of the present day, and utterly unworthy of a town of the importance of Carlisle. The engines are practically worn out, and, having to be worked day and night continuously for considerable periods, the danger of breakdown is imminent; while the pumps are of obsolete design, and impose much useless resistance upon the engines—the result being that the cost of pumping is considerably more than it should be. The filtering arrangements are so defective that at times during the summer months when the draught upon the system is at its maximum, and the necessary processes of cleansing a filter-bed are in operation, the water has to be delivered through the remaining bed at a much greater speed than modern practice demands as the rate for proper and efficient filtration. In other words, during the period of the year when the risk to health is greatest, the water, technically speaking, is not filtered—it is only passed through the filter-beds. The pressure capable of being maintained upon the distributing apparatus within the district of supply is utterly insufficient, and is the cause of complaint on the part of the consumers, besides being a source of danger when fires occur.

Passing on to deal with the schemes in the order in which they were presented to him, he points out that the one for obtaining a supply of water by gravitation from the River Gelt has for its main object the abstraction of water from certain springs, which observation has shown to be of a perennial character, and, as to some of the more important, of singular uniformity of flow. It is contemplated that not less than a prescribed minimum quantity of water shall at all times be left to flow down the bed of the river, so as to provide for agricultural and riparian necessities below the point of abstraction. The drainage area of the Gelt down to the proposed intake is about 7424 acres, of which 2714 acres shed into the Old water, and 4710 acres discharge into the New water. Mr. Eaton's attention having been directed to the possibility of the Gelt water being at times coloured by peat stain, he examined with great care the bed of the stream, and came to the conclusion that the Gelt is in no sense a peaty river as usually understood, and that its water is simply perfect for all the purposes of a public supply; indeed, for freedom from resident population and absence of pollution, he says the valley deserves to be termed an ideal watershed. He examined the Castlecarrock valley, with a view of ascertaining its suitability for the construction of a storage reservoir; and, in his judgment, it can be safely, efficiently, and economically formed at the place selected by Mr. Newton for the purpose. He therefore unhesitatingly recommends this site, which is of so favourable a character that he can with confidence reduce Mr. Newton's estimate by about £9500. He is therefore of opinion that the cost of this scheme should not exceed, in round figures, for works and land, £120,000.

With respect to the second scheme—to obtain a supply of water by pumping from the Eden at Coat House Island—Mr. Eaton considers it to be the most meritorious in its inception; and but for the fact that its advantages are quite overshadowed by the Geltsdale scheme, it would, he says, deserve the most earnest consideration of the Committee. He thinks it could be carried out for the estimated amount—£90,577. But it has, in his judgment, a fatal defect—viz., that it is a pumping scheme. If the city had no source of water supply capable of being furnished by gravitation, he would urge the Coat House Island scheme upon the acceptance of the Committee. But, having the Gelt equally available, of superior quality, and adequate in quantity for all purposes, he can see but one possible reason to suggest a pumping scheme, and that is the question of cost. But he goes on to show that when properly regarded, the eventual outlay would, under the peculiar circumstances of Carlisle, be really in favour of a gravitation scheme. He says: "The difference in cost between the two schemes is £29,423 for the entire quantity of 2½ million gallons per day; but the additional cost incurred in pumping the water, as compared with the working expenses under the gravitation scheme, will be in round figures £1500 per annum. Capitalizing this at 4 per cent., or 25 years' purchase, the eventual cost to the city under these conditions would be £128,077 for the pumping scheme, or £8077 in excess of the gravitation scheme; without taking into account repairs and replacement of machinery, not included in the above £1500 per annum. He adds that even this is too sanguine a view to take, for the Committee would not in fact create a fund out of which to provide the working expenses; so that the charge of £1500 per annum would not cease at the end of 25 years, but would remain in perpetuity.

Coming finally to the scheme for extending and improving the existing works, Mr. Eaton says it was evidently prompted by a desire on the part of Mr. Newton to utilize, as far as possible, the existing works and sources of supply of the city. But he fails to discover that his colleague is satisfied with the proposal he makes, for in his report he calls attention to the insufficiency of the works when completed. Mr. Eaton considers that any attempt to reorganize the existing reservoirs and filter-beds would result in a waste of money, give no permanent satisfaction, and within a comparatively few years would involve a further expenditure for an increased supply, which could much better be undertaken now. If the Committee really contemplate drawing water from the Eden at the present pumping-station for the future supply of Carlisle, he recommends that entirely new subsiding reservoirs, filter-beds, and clear-water tank should be constructed adjacent to the existing works; the engine-house strengthened and repaired, and a new powerful engine of modern type erected in place of the present Cornish engine; with a service reservoir as indicated by Mr. Newton in his report. A duplicate engine should then be provided. He advises the clearing out of the present subsiding reservoirs and filter-beds entirely, with the construction upon their site of a large subsiding reservoir having a properly-formed bottom and sides; for, owing to the condition of the water in the Eden during long periods of time, it would, he says, be very advisable to have storage capacity for at least from two to three weeks. He does not give detailed estimates of the cost of these suggested works; but he is of opinion that the necessary outlay would be about £91,000.

Summing up his observations on the three schemes, he says: "If Carlisle possessed no other source of water supply, doubtless the last suggested scheme would afford one, which, with care in the selection of the water, would be highly satisfactory. The total cost would, however, be, on the whole, slightly greater than the supply to be furnished from the Coat House Island scheme, by reason of the superior quality of the water at the latter place, and the consequent lessening of expense in subsidence and filtration. But I have already indicated that the Coat House Island scheme is rather more costly, when the extra expenses for pumping are considered, than the Geltsdale scheme; so that, on the ground of economy, purity of supply, and simplicity of working arrangements, I unhesitatingly recommend for your acceptance and adoption the scheme for the supply of water by gravitation from Geltsdale."

The Water Committee having fully considered the whole question of the future water supply of the city, unanimously agreed to recommend the Council to carry out the Gelt gravitation scheme; and this recommendation came before the Council at their meeting last Tuesday. Mr. Eaton was in attendance, and answered certain objections raised to the scheme, on account of the discoloration of the water by peat stain. He said the water supplied in Huddersfield and Sheffield—towns with which he was well acquainted—came from the gathering-grounds quite black; but it was stored in reservoirs of considerable magnitude, and when it reached the consumers the peaty products were entirely removed. In neither case was the water filtered. The scheme was unanimously adopted; and steps will be taken to obtain the necessary parliamentary powers in the ensuing session for carrying it out.

## THE SALE OF WATER BY METER IN NEW YORK.

The city of New York collected for water sold by meter measurement last year, $1,999,872; and the amount returned to the bureau of arrears was $270,687—making a total of $2,270,559. The total amount of revenue collected from all sources, together with that returned to the bureau of arrears, was $4,144,057, which leaves the amount collected for water-rents for 1896, exclusive of meter measurement, $1,873,497. The number of gallons of water consumed last year, according to the Chief Engineer's report, was 80,300 millions. The quantity consumed to produce the above-named revenue from meter measurement would be, in round numbers, something less than 16,000 million gallons. If the entire supply of the city were metered, at the rates now charged for water, the revenue would be $10,794,000, instead of a little more than $4,000,000, as at present. But allowance should be made for the water supplied to public properties, to public institutions in the city, for fire purposes, to the Street Cleaning Department, and unavoidable waste in the mains. For these purposes, an amount equal to that consumed by meter measurement would be vastly in excess of the actual quantity; so that the inequitable disparity between revenue for meter charges and regular rates would be about as follows: The city received $2,270,559·44 for about 16,000 million gallons supplied through meters, and $1,873,497 for 48,000 million gallons consumed at regular rates. As another result of the meter system, unnecessary and inexcusable waste of water by consumers is promptly, readily, and willingly corrected. There are about 35,000 meters in use in New York. Speaking of the present administration of the Water Department, Mayor Strong, in his message to the Board of Aldermen early in the year, said: "For the first time in the history of the city, the revenue collected last year from water-rents was more than enough to reimburse the city for the entire outlay of the Department of Public Works, which is taken from taxation."

**Gas Workers and Carburetted Water Gas.**—As previously mentioned in the "JOURNAL," the Stockport Trades Council strongly opposed the introduction of carburetted water gas into the borough, on the ground that it would be detrimental to the health of persons employed in the gassing department of cotton doubling mills, and also of those engaged in the manufacture of the gas. On the latter point they addressed a letter to the Town Clerk. This communication was handed to Mr. S. Meunier, Engineer and Manager of the gas-works; and he has replied as follows: "The risks to which the men are exposed in the manufacture of carburetted water gas are certainly not greater, if as great as those incurred by the ordinary gas workers. The usual precautions are taken with this portion of the works as are taken with any other, and are certainly considered to be amply sufficient. I may say that the men themselves have never complained, nor is there any reason to suppose that they have any cause for complaint."

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

The erection of a memorial to the late Mr. John M'Crae, of Dundee, by the members of the North British Association of Gas Managers, is a tribute of respect which is as pleasing as it is genuine. Mr. M'Crae was a man of pronounced character, whose memory his colleagues are not likely to forget; but this memorial, with its simple inscription, will infallibly keep his name alive in the breasts of all who knew him, and will testify to others the worth of the man commemorated, as well as the generous spirit of those who have furnished the memorial.

Information has been received that Mr. W. D. Gibb has been promoted by the Directors of the Newcastle and Gateshead Gas Company from the post of Engineer and Manager of the Company's works at Elswick, to that of Engineer to the Company's whole undertaking. Mr. Gibb is a native of Edinburgh; and his many friends there are highly gratified at his receiving so important an appointment at an early period of life. He was a pupil of the late Mr. F. T. C. Linton, of Leith; and his early success may be attributed largely to the excellence of his training under that distinguished Gas Manager. One of Mr. Gibb's first duties will be the erection of an entirely new gas-works, so that he will have immediate scope for his talents and his energies.

The Philadelphia firm whom I mentioned last week as having offered to supply cast-iron pipes to the Glasgow Gas Committee and the Dundee Water Committee, are bent on doing business in this country. They have not secured the Glasgow contract, which has been given, after full consideration by the Committee, to Messrs. Shaw and M'Innes, of Maryhill. They have been equally unsuccessful in a tender for the supply of 1000 tons of pipes which they sent in to the Edinburgh and District Water Trust. But Mr. Archibald, in recommending that the tender of Messrs. R. Maclaren and Co., of Glasgow, be accepted, was careful to point out that, had it not been for the fact that the Trust were pressed for time, they would probably have accepted the American tender. Messrs. Maclaren's price was £5287, that of the American firm £4790; so that they would have saved nearly £500 upon the one contract. The pipes too, Mr. Archibald said, would have been more suitable for them, as they were to be in 12-feet lengths, instead of 9-feet as are Messrs. Maclaren's. The Americans may be expected to make a further effort to obtain a footing here; and they are almost certain to be successful, unless home makers see their way to lower prices.

The Glasgow Corporation Gas Committee have bought the balance of their supplies of coal for the gas-works. The quantity is about 50,000 tons. The prices paid for splint are from 7s. 2d. to 7s. 5d. per ton—the bulk being at 7s. 3d.—as compared with 7s. 5d. to 7s. 6d. a fortnight ago. The prices then agreed to were considered to be high; and the Committee have been able to get offers at lower figures.

The proposal to remove the Edinburgh Gas-Works is not likely to be lost sight of. This week, at a meeting of the Edinburgh Merchants' Association, Mr. J. M. Turnbull, who takes an enlightened interest in gas affairs, moved a resolution to the effect that, as the question of the gas-works was at present being considered, the Association, under reference to their report of April 6, 1892, anew memorialize the Gas Commissioners to proceed with the removal of the Edinburgh Gas-Works. He thought that the erection of new works would not increase the price of gas, but would actually cheapen it. Mr. J. A. Trevelyan Sturrock, who said he thought the gas-works should be nearer the sea, and that the two chimneys of the works were the greatest blot on the face of Edinburgh, seconded. The Chairman (Bailie Pollard) said he believed the Gas Commissioners would value the opinion of an Association such as theirs. The motion was adopted.

It is announced that the Solicitor-General for Scotland (Mr. Scott Dickson, Q.C.) has given an opinion to the Ward Committees in Stirling regarding the legality of charging the costs of the Gas Bill of last session upon the Common Good of the Burgh. His opinion is that the expenses cannot be legally assessed for under any of the heads of charge properly falling to be provided for by the police rates, and that the Police Commissioners *qua* Town Councillors have acted illegally in borrowing £3000 on the security of the Common Good, and applying the same in payment of the said expenses. To make the Common Good responsible, was to pay creditors who had no valid claim against the Common Good; and such of the Town Councillors as were parties to charging the Common Good with the expenses, may be made responsible if challenged by the proper party. Counsel is of opinion, however, that the memorialists have no title to sue; the only sufficient title being in the burgh through its legal representatives, as the decision in the *Burgesses of Inverurie v. Magistrates of the Burgh*, of Dec. 14, 1820, is still law. Six of the promoters of the Gas Bill retire in November; and the Ward Committees have resolved to oppose them in every ward. This resolution is being vigorously put into execution. There have been meetings of the electors in at least two of the wards in the burgh, at which the councillors who promoted the transfer have been severely "heckled" on their action; but nothing edifying, or of any other interest except personal, has been elucidated. What the Council did cannot be undone. But the opinion of the Solicitor-General seems capable of the interpretation that, if the opposition can turn out some of the sitting members, and obtain a majority in the Council, they might then, as a Council, sue the individual members of the present Council for the expenses. The probability is that they will get some of the councillors out; for the prospect of being able to recover £3000 is more than human nature can be expected to resist. But there is a further question which may give pause to any proposal to sue the individual members of the Council. The accounts of Counsel's opinion differ. One of them goes the length of saying he has laid down that only the individual members of the Council who voted for the transfer are liable to be sued, and that those who did not vote are not liable. The other—the one which I consider the more reliable—makes no mention of this clause. Without seeing the memorial which was presented to the Council, it is unsafe to hazard an opinion; but it seems unlikely that any such limit should be applicable to liability. Councillors who dissented at the time, and had their dissent recorded, may be exempt; but the doctrine is that, though the act may be resolved upon by only a majority, it is the act of the whole Council. If this should be the case, then the opposition would be under the necessity of prosecuting their own friends, as well as those whom they regard as their foes. To do this would be unkind; and then abstention from prosecution would mean the reduction of the success of the party of opposition at the polls to that situation which is of small advantage to anyone, known as "a moral victory." The opposition in Stirling may be relied upon to snatch even that if they can get nothing more. If my advice could reach the community, it would be to be cautious how they belittle the public service. The men who would seek to turn representatives out of office upon such grounds as here stated, are not likely to be the cream of the electorate. No self-respecting man would place himself in the position of possibly having some such action taken against himself; and thus the quality of the Council would be lowered. I have in my mind two places—one in Scotland and the other in England—where the control of the councils has got into the hands of men of inferior grade, with results which are not at all encouraging.

The Lord Provostship of Edinburgh becomes vacant this year. There are understood to be three candidates for the office, one of whom is Bailie Kinloch Anderson, who is familiar to readers of the "JOURNAL" in his capacity of Convener of the Works Committee of the Edinburgh and Leith Gas Commission. He has done a vast amount of work for the city, both as town councillor and gas commissioner—far more than any of the other candidates—and I hope the Council will give him the highest award in their power, by electing him Lord Provost.

The Dumfries Gas Commission last week had before them the subject of procuring a loan of £10,000, to enable them to wipe out an overdraft at the bank of £7650, and to provide for extensions. The immediate saving in interest upon the overdraft, it was stated, would be £170 a year. Since 1878, the Commissioners have borrowed £40,000, and repaid £18,161; leaving £21,839 due. It was resolved to proceed with the negotiation of the loan.

Last night some of the municipal wards in Greenock held their annual meetings; and the representatives rendered accounts of their stewardship. Electric and gas lighting "bulked largely" in their remarks. Bailie M'Innes, a former energetic member of the Gas Committee, said there had been no general expression of opinion by the ratepayers that the electric light was wanted by the ratepayers; and it was a question if they would care to burden themselves at this juncture with an electrical installation in addition to their gas-works. If they did, the advice of an expert on the matter should first be obtained. Private firms and shopkeepers might, no doubt, be pleased to have a supply of electricity at the public expense; but electric lighting had proved a costly business for many corporations. Mr. M'Neil, speaking at the meeting, pointed out that the gas-works of the Corporation were still burdened with a sum nearly approaching £100,000, and that an installation of the electric light would not cost much, if any, less than this figure. If the question of supplying electricity was to be approached, it must be in a cautious manner—not "rushed." Speakers at other meetings urged that only the consumers should get the advantage of any profit that might accrue from the sale of gas; and that nothing should be done to injure the town's gas property. Mr. Cameron, addressing the Fifth Ward, said he was in favour of inquiring into the electric lighting question, as it was one which must be solved if Greenock was to maintain its position as one of the chief towns in Scotland. He thought gas and the electric light could both be worked to advantage to the community and with profit to the ratepayers. In reply to a question, he said he approved of a reasonable sum being set apart by the Police Board for the management of the gas affairs of the town; and therefore, as the ratepayers had a contingent liability, he thought before ascertaining the profits, the Gas Committee should be debited with a sum equal to the premium on the guarantee given by the Board to those who lend money to the Gas Trust.

The construction of a new gasholder at the Arbroath Gas-Works is almost completed. There have been two holders in the works—one of 45,000, and the other of 204,000 cubic feet capacity. The smaller holder was about sixty years old, and was in a leaky condition. Upon the advice of Mr. R. S. Carlow, the Engineer and Manager, the Corporation last spring resolved to abolish the smaller holder, and in its place to construct one of 105,000 cubic feet capacity, and to telescope the other existing holder. Only the smaller holder has been dealt with so far; the telescoping of the larger one having been left over till next year. When it is completed, there will be storage for 309,000 cubic feet of gas. The highest recorded daily output last year was 340,000 cubic feet. The new holder is 67 feet in diameter, and consists of two lifts each 18 feet high. It has been built by the Barrowfield Iron-Works, Limited, of Glasgow.

The shareholders of the newly-constituted Pitlochry Gaslight Company held their first statutory meeting on Monday. It was reported that the whole of the capital of the Company had been taken by the shareholders of the old concern; that a dividend of 5 per cent. had been paid on the stock of the old Company; and that there was a balance left of upwards of £100.

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**Progress of the Marsden Gas Undertaking.**—The members of the Gas Committee of the Marsden District Council recently invited their fellow-councillors to visit the gas-works, which have been in their hands for about ten years. The inspection was carried out under the supervision of the Manager (Mr. F. Lee); and everything was found in good order. The party subsequently took tea together under the presidency of the Chairman of the Committee (Mr. A. Robinson). In the course of the proceedings, he gave a few particulars as to the progress of the works, which were purchased in 1887 for £5200. He said this sum was borrowed at 3½ per cent., to be repaid in thirty years. Since then £2050 had been liquidated; leaving a debt of £3150. The sum of £3500 also had since been paid on capital account. Within the past few years several improvements had been carried out. In 1893 a new gasholder, capable of containing 100,000 cubic feet, was erected in place of the old one which only held 30,000 cubic feet. The retort-house roof had been renewed, and a new bench of retorts, fired on the generator principle, erected. Improvements had been made in other parts of the plant. The works had made great progress since 1888. The annual consumption then was 6,200,000 cubic feet; whereas for last year it was 11,800,000 cubic feet—being an increase of 90 per cent. in nine years. The number of consumers had increased from 262 to 400; the number of public lamps, from 45 to 78. The price of gas had been reduced from 3s. 4d. to 2s. 11d. per 1000 cubic feet.

## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 16.

**Sulphate of Ammonia.**—There has again been a quiet market, and prices are slightly easier; to-day's quotations being £8 to £8 2s. 6d. per ton, delivered free on board at the ports. The actual business done has been limited by the action of speculators, who, while postponing covering their own requirements, have been keeping consumers abroad quiet by offering up to the end of the year at, and below, the equivalent of present f.o.b. prices. The larger makers, having already sold the bulk of their October production, have kept out of the market, and others, having only current make to deal with, have not generally been pressing sales. An improved demand may reasonably be expected to set in shortly. Meantime, the exports continue on a very satisfactory scale; the increase up to the end of September being about 20,000 tons over those of January-September, 1896 – *i.e.*, about 20 per cent.

**Nitrate of Soda** is quiet at 7s. 4½d. per cwt. for fine quality.

LONDON, *Oct.* 16.

**Tar Products.**—Tar products show a fairly steady market, although prices in some instances are unsatisfactory. Distillers with high-priced tar are bitterly complaining of the low price of pitch, and say it is not warranted by the position of the fuel market. There does not seem very much chance of improvement at the moment; buyers being rather indifferent, and well covered. Solvent naphtha is scarce; and sales have been made at improved prices. A little more inquiry is noticed for anthracene; and considerable quantities of low quality have changed hands. Naphthalene is also in better request. Carbolic acid is dearer, with a tendency to still higher rates. Creosote is dull; but makers are pretty well sold.

The average week's prices may be taken as: Tar, 17s. to 21s.; Pitch, 17s. to 20s.; Benzol, 90's, 1s. 11½d.; 50's, 1s. 11d. Toluol, 2s. 1½d.; Solvent naphtha, 1s. 8d. Crude, 30 per cent., naphtha, 11d. Creosote, 1½d.; liquid, 2d. Heavy oils, 35s. Carbolic acid, 60's, 1s. 11d. Naphthalene, pressed, 52s. 6d.; Salts, 27s. Anthracene, "A quality," 5½d.; "B," 4d. to 4½d.

**Sulphate of Ammonia** is not dearer; but the market is steady, with plenty of buyers. The position is a strong one, as makers hold less stocks than have been held for many years. The market for sulphate is enormously extended; and its field of use has grown. Business during the week has been done at £7 18s. 9d. to £8 2s. 6d., less 3½ per cent.

**New Joint-Stock Companies.**—The following joint-stock undertakings have lately been started: Ongar Water-Works Company, Limited, with a capital of £2000 in £5 shares, to supply the parishes of Chipping Ongar, High Ongar, and Greenstead, in Essex, with water. Birmingham Intensified Gas-Light Syndicate, Limited, with a capital of £2000, in £1 shares, to acquire, develop, and work the Somzée-Greyson Intensified Gas-Light Syndicate, Limited. Eclipse Prepayment Gas-Meter Syndicate, Limited, with a capital of £5000, in £1 shares, to acquire and work certain patents for improvements in coin-freed gas-meters.

## COAL TRADE REPORTS.

**From Our Own Correspondents.**

**Lancashire Coal Trade.**—In all descriptions of round coal there is a continued steady hardening, owing, however, chiefly to increased requirements for house-fire consumption, which are enabling pits mostly to run full time, and are as a rule taking away all the present output. The position with regard to the lower qualities of round coal is also strengthened by the extra requirements for domestic purposes; and there are no surplus supplies of these upon the market. Prices are not only strong for inland sales, but representatives of collieries are indifferent about entertaining shipping orders except at some advance upon recent quotations. Engine classes of fuel, as a necessary consequence of the activity in round coals, are more plentiful in the market; and on temporary clearance sales, lower prices are in some cases being taken. Most of the leading collieries are, however, well-contracted. The forward contract prices for engine fuel are strong; and generally some advance on present rates is being held for. At the pit mouth, prices are firm at 10s. 6d. to 11s. per ton for best Wigan Arley; 9s. to 9s. 6d., for Pemberton four-feet and seconds Arley; 7s. to 7s. 6d., for common house coal; and 6s. 6d., for steam and forge coal. Engine fuel ranges from 3s. and 3s. 6d. per ton for common sorts, 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 4s. 9d. for best qualities. For shipment, rather better prices have been obtained; 8s. to 8s. 3d. being about an average figure for good qualities of steam coal delivered at the ports on Mersey.

**Northern Coal Trade.**—There has been a renewal of activity in the coal trade of the North in the last few days; shipments having been much larger, and only limited by the steam tonnage that offered. Best Northumbrian steam coals are 8s. 4½d. to 8s. 6d. per ton f.o.b.; and steam smalls, 3s. 6d. For gas coals, the demand is steady, and the shipments to the south are larger than usual at this time of the year. The price asked for single cargoes is as high as 8s. per ton f.o.b.; but a large part of the delivery is taken up by old contracts at much lower rates. For future contracts, however, the price asked approaches that named. At present the output of the gas coal collieries is fairly well taken up, so that with the fuller demand of the next few weeks the output will barely meet the needs. Gas coke is unaltered in price; but local gas producers are endeavouring to foster the household consumption in their own localities.

**Scotch Coal Trade.**—It may be said that no change has been experienced, though splint is in some places a little easier in price. The demand keeps up; and the supply is more regular and reliable than it frequently is. The prices quoted are: Main, 7s. per ton f.o.b. Glasgow; ell, 7s. 6d. to 7s. 9d.; and splint, 7s. 6d. The shipments for the week amounted to 167,657 tons—a decrease of 25,116 tons as compared with the preceding week, but an increase of 7169 tons over the corresponding week of last year. For the year to date, the total shipments have amounted to 6,244,669 tons—an increase upon the same period of last year of 253,518 tons.

## GAS AND WATER COMPANIES' STOCK AND SHARE LIST

**Referred to on p. 840.**

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p. c. | GAS COMPANIES. | | | £ s. d. |
| 590,000 | 10 | Oct. 14 | 10½ | Alliance & Dublin 10 p. c. | 24–25* | +½ | 4 4 0 |
| 100,000 | 10 | ,, | 7½ | Do. 7 p. c. | 17–18* | +1 | 4 3 4 |
| 300,000 | 100 | July 1 | 5 | Australian 5 p. c. Db. | 106–108 | .. | 4 12 8 |
| 200,000 | 10 | May 27 | 7 | Belgrano (B. Ayres), Ltd | 10¼–10¾ | +¼ | 6 10 3 |
| 100,000 | Stk. | June 29 | 5 | do. 5 p. c. Db. Stk. | 107–110 | +2½ | 4 10 11 |
| 200,000 | 5 | May 27 | 6½ | Bombay, Ltd. | 6¾–7¼ | .. | 4 9 7 |
| 40,000 | 5 | ,, | 6½ | Do. New, £4 paid | 5¼–5¾ | .. | 4 10 7 |
| 380,000 | Stk. | Aug. 27 | 12 | Brentford Consolidated | 300–305 | .. | 3 18 8 |
| 240,000 | ,, | ,, | 9 | Do. New | 225–230 | +3 | 3 18 3 |
| 50,000 | ,, | ,, | 5 | Do. 5 p. c. Prf. | 145–150 | .. | 3 6 8 |
| 159,375 | ,, | June 11 | 4 | Do. 4 p. c. Db. Stk. | 135–139 | .. | 2 17 6 |
| 220,000 | Stk. | Sep. 15 | 11½ | Brighton & Hove Orig. | 270–275 | .. | 4 3 7 |
| 208,820 | ,, | ,, | 8½ | Do. A. Ord. Stk. | 200–205 | .. | 4 2 11 |
| 933,500 | Stk. | Aug. 27 | 5 | Bristol, 5 p. c. max. | 130–135 | .. | 3 14 1 |
| 420,000 | 20 | Sep. 30 | 11½ | British | 56–57 | +½ | 3 18 11 |
| 50,000 | 10 | Aug. 27 | 11½ | Bromley, Ord. 10 p. c. | 25–27 | .. | 4 5 2 |
| 71,000 | 10 | ,, | 8½ | Do. 7 p. c. | 20–22 | .. | 3 17 3 |
| 500,000 | 10 | Oct. 14 | 6 | Buenos Ayres (New) Ltd | 10–11* | .. | 5 9 1 |
| 98,122 | Stk. | — | 4 | Do. 4 p. c. Db. Stk. | 98–100 | .. | 4 0 0 |
| 150,000 | 20 | July 15 | 8½ | Cagliari, Ltd. | 30–32 | .. | 5 3 1 |
| 100,000 | 10 | Sep. 30 | 8 | Cape Town & Dis., Ltd. | 17–18 | .. | 4 8 11 |
| 50,000 | 50 | May 3 | 6 | Do. 6 p. c. 1st Mort. | 60–61 | .. | 4 18 5 |
| 550,000 | Stk. | Oct. 14 | 13½ | Commercial Old Stock | 340–345* | +1½ | 3 18 3 |
| 196,483 | ,, | ,, | 10½ | Do. New do. | 255–260* | +2½ | 4 0 9 |
| 196,309 | ,, | June 11 | 4½ | Do. 4½ p. c. Lb. do. | 155–158 | .. | 2 16 11 |
| 800,000 | Stk. | June 11 | 13 | Continental Union, Ltd. | 257–262 | .. | 4 19 3 |
| 200,000 | ,, | ,, | 10 | Do. 7 p. c. Prf. | 217–222 | .. | 4 10 2 |
| 51,600 | Stk | Aug. 27 | 14 | Croydon A 10 p. c. | 315–320 | .. | 4 7 6 |
| 163,400 | ,, | ,, | 11 | Do. B 7 p. c. | 252–257 | .. | 4 5 7 |
| 535,000 | Stk. | Aug. 12 | 5¼ | Crystal Palace Ord. 5 p. c. | 137–140 | .. | 3 15 0 |
| 60,000 | ,, | ,, | 5 | Do. 5 p. c. Prf. | 140–143 | .. | 3 9 11 |
| 486,090 | 10 | July 29 | 11 | European, Ltd. | 25½–26½ | .. | 4 3 0 |
| 354,060 | 10 | ,, | 11 | Do. £7 10s. paid | 18–19 | .. | 4 6 11 |
| 5,896,590 | Stk. | Aug. 12 | 12¾ | Gaslight & Coke, A, Ord. | 316–319 | .. | 3 19 11 |
| 100,000 | ,, | ,, | 4 | Do. B, 4 p. c max. | 113–118 | .. | 3 7 10 |
| 665,000 | ,, | ,, | 10 | Do. C, D, E, 10 p. c. Prf. | 317–322 | .. | 3 2 2 |
| 30,000 | ,, | ,, | 5 | Do. F, 5 p. c. Prf. | 150–155 | .. | 3 4 6 |
| 60,000 | ,, | ,, | 7½ | Do. G, 7½ p. c. do. | 220–225 | .. | 3 6 8 |
| 1,300,000 | ,, | ,, | 7 | Do. H, 7 p. c. max. | 203–208 | .. | 3 7 4 |
| 463,000 | ,, | ,, | 10 | Do. J, 10 p. c. Prf. | 317–322 | .. | 3 2 2 |
| 476,000 | ,, | ,, | 6 | Do. K, 6 p. c. Prf. | 182–187 | +2 | 3 4 2 |
| 1,061,150 | ,, | June 11 | 4 | Do. 4 p. c. Db. Stk. | 138–141 | .. | 2 16 9 |
| 294,850 | ,, | ,, | 4½ | Do. 4½ p. c. do. | 156–159 | .. | 2 16 7 |
| 908,000 | ,, | ,, | 6 | Do. 6 p. c. do. | 207–212 | .. | 2 16 7 |
| 70,000 | 10 | May 13 | 8 | Hongkong & China, Ltd. | 14–15 | .. | 5 6 8 |
| 3,800,000 | Stk. | May 13 | 10 | Imperial Continental | 220–225 | .. | 4 8 11 |
| 376,400 | 100 | Aug. 3 | 4 | Do. 4 p. c. Dbs. Red. | 99–102 | .. | 3 18 5 |
| 473,600 | Stk. | Aug. 12 | 3½ | Do. 3½ p. c. Db. Stk. | 104–107 | .. | 3 5 5 |
| 75,000 | 5 | June 29 | 6 | Malta & Medn., Ltd. | 5½–6 | .. | 5 0 0 |
| 560,000 | 100 | Oct. 1 | 5 | Metropolitan Electric 5 p. c. Db. | 110–112 | .. | 4 9 3 |
| 250,000 | 100 | ,, | 4½ | Monte Video, Ltd. | 15–16 | .. | 6 5 0 |
| 541,920 | 20 | June 11 | 5 | Oriental, Ltd. | 8¾–8¾ | .. | 4 11 5 |
| 150,000 | 5 | May 27 | 8 | Do. New, £4 10s. pd. | 7¼–7¾ | .. | 4 12 10 |
| 135,000 | 5 | ,, | 8 | Do. do. 1879, £1 pd. | 1¾–2 | .. | 4 0 0 |
| 15,000 | 5 | ,, | 8 | Ottoman, Ltd. | 4¾–5 | .. | 7 0 0 |
| 60,000 | 5 | Sep. 30 | 7 | People's Gas of Chicago 1st M. Bd. | 104–109 | .. | 5 10 1 |
| 420,000 | 100 | May 3 | 6 | People's Gas of Chicago 2nd do. | 105–110 | .. | 5 9 1 |
| 500,000 | 100 | June 1 | 6 | San Paulo, Ltd. | 14½–15½ | .. | 6 9 0 |
| 250,000 | 10 | Sep. 30 | 10 | South Metrop., 4 p.c Ord | 145–148 | .. | 3 10 11 |
| 5,475,000 | Stk. | Aug. 12 | 5½ | Do. 3 p. c. Db. Stk. | 106–109 | .. | 2 15 0 |
| 1,416,667 | ,, | July 15 | 3 | Tottenham and Edmonton A. | 280–290 | .. | 4 2 9 |
| 60,000 | Stk. | Sep. 15 | 12 | Edmonton B. | 205–215 | .. | 4 3 9 |
| 60,000 | ,, | ,, | 9 | Tuscan, Ltd. | 13¾–14½ | .. | 6 18 0 |
| 182,380 | 10 | May 27 | 10 | Do. 5 p. c. Dbs. Red. | 102–105 | +2 | 4 15 3 |
| 149,900 | 10 | July 1 | 5 | | | | |
| | | | | WATER COMPANIES. | | | |
| 746,159 | Stk. | June 29 | 10½ | Chelsea, Ord. | 337–342 | .. | 3 1 5 |
| 150,000 | ,, | ,, | 5 | Do. 5 p. c. Prf. | 177–180 | .. | 2 15 6 |
| 160,000 | ,, | ,, | 4½ | Do. 4½ p.c. 1 f. Stk., 1875 | 157–160 | .. | 2 16 3 |
| 175,785 | ,, | Sep. 30 | 4½ | Do. 4½ p. c. 1 b. Stk. | 160–165 | .. | 2 14 6 |
| 1,720,560 | Stk. | Oct. 14 | 7½ | East London, Ord. | 232–237* | +5¾ | 3 3 4 |
| 654,740 | ,, | June 29 | 4½ | Do. 4½ p. c. Db. Stk. | 163–166 | .. | 2 14 3 |
| 390,000 | ,, | ,, | 3 | Do. 3 p. c. Db. Stk. | 106¾–107¾ | .. | 2 15 10 |
| 700,000 | 50 | June 11 | 7½ | G'd Junct'n, 10 p. c. max. | 122–126 | +1½ | 2 19 6 |
| 295,000 | Stk. | Sep. 30 | 4 | Do. 4 p. c. Db. Stk. | 147–152 | .. | 2 12 8 |
| 708,000 | Stk. | Aug. 12 | 13 | Kent | 357–362 | +5 | 3 11 10 |
| 160,000 | ,, | ,, | 7 | Do. New, 7 p. c. max. | 215–220 | .. | 3 3 7 |
| 1,043,800 | 100 | June 29 | 9½ | Lambeth, 10 p. c. max. | 292–297 | +2 | 3 5 8 |
| 406,200 | 100 | ,, | 7½ | Do. 7½ p. c. max. | 223–228 | .. | 3 5 9 |
| 350,000 | Stk. | Sep. 30 | 4 | Do. 4 p. c. Db. Stk. | 147–150 | .. | 2 13 4 |
| 500,000 | 100 | Aug. 12 | 13 | New River, New Shares | 450–455 | +2 | 2 17 1 |
| 1,000,000 | Stk. | July 29 | 4 | Do. 4 p. c. Db. Stk. | 152–155 | +1 | 2 11 7 |
| 902,300 | Stk. | June 29 | 5 | Southw'k & V'xhall, Ord. | 162–165 | +1 | 3 0 7 |
| 126,500 | 100 | ,, | 5 | Do. do. 7½ p. c. max. | 151–154 | .. | 3 4 11 |
| 489,200 | Stk. | ,, | 5 | Do. do. 5 p. c. Prf. | 173–178 | .. | 2 16 2 |
| 1,019,585 | ,, | Oct. 14 | 4 | Do. 4 p. c. A Db. Stk. | 144–147* | +1 | 2 14 7 |
| 1,155,066 | Stk. | June 11 | 10 | West Middlesex | 315–320 | .. | 3 2 6 |
| 200,000 | ,, | ,, | 4½ | Do. 4½ p. c. Db. Stk. | 163–166 | .. | 2 14 3 |

*Ex div.

**Sales of Shares.**—Last week, two fully-paid £10 shares in the Epping Gas Company were sold for £18 10s. each, and four similar shares at £18 15s. apiece. Some "B" shares, of £20 each, in the Colchester Gas Company have lately been disposed of at prices ranging from £35 to £35 15s. each. At a local sale on Wednesday, twenty fully-paid "C" shares in the Northampton Gas Company were disposed of at £38 and £38 5s. each; and fully-paid "D" shares made £11 apiece.

**Wakefield Gas Company's Assessment Appeal.**—As the result of this appeal, the Assessment Committee have reduced the rateable value of the Company's property from £8303, at which it has stood for the past ten years, to £7331—a reduction of £972. This will save the Company £324 per annum. The assessment is still much too high; but the Directors were advised to accept the offer of the Committee. In this matter, they have had the invaluable assistance of Mr. T. Newbigging and Mr. Corbet Woodall.

**The West Cowes Gas-Works Arbitration.**—Touching upon the arbitration in connection with the transfer of the Cowes Gas Company's works to the District Council, it was reported at last Tuesday's meeting of the latter body that Mr. Shiress Will, Q.C., had been nominated to act as Umpire, and that Mr. W. R. Chester, of Nottingham, and Mr. W. A. Valon, of Ramsgate, have been retained to give expert evidence. As previously announced, the Arbitrator for the Company will be Mr. Corbet Woodall, and for the Council Mr. E. H. Stevenson.

**The New Contract of the San Paulo Gas Company.**—We learn from the Secretary of the San Paulo Gas Company (Mr. G. Rogers) that a cablegram has been received from the Manager announcing that a new contract between the San Paulo Government and the Company for the lighting of the city by gas was signed on the 13th inst. Its general terms, which will come into force on Jan. 1, 1898, are, in the opinion of the Directors, satisfactory to all concerned. The most important features are as follows: (1) The period is for 30 years, as compared with 25 years in the old contract; (2) the price of gas, both for public and private lighting, is fixed on a gold basis; (3) the works and plant remain the property of the Company at the termination of the contract; and (4) the rights of the Company in regard to lighting by electricity are fully protected.

**Incandescent Gas Lighting at Salisbury.**—A proposal was made by Mr. H. Harris, at the last meeting of the Salisbury Town Council, that the whole of the public lamps should be fitted with incandescent burners. In support of his motion, he stated that there were 280 lamps in the city, 148 of which were summer, and 132 winter lamps; and £850 per annum was paid for them. With the incandescent system one-third of the cost would be saved; and the Committee would only have to pay £567. The conversion of the whole of the lamps would cost £217, or 15s. 6d. each; and the annual cost of maintenance would not exceed £63 16s. per annum, which would make the annual cost of lighting the city £630, instead of £850 as at present. Much interest was shown by the members in the subject; but it was thought that an experiment with the lights should first be made. It was therefore agreed to try them for six months in two of the main thoroughfares, and to postpone Mr. Harris's motion until after the lapse of that period.

**Kirkby Lonsdale Gas-Works Arbitration.**—In connection with the agreement recently arrived at for the transfer of the Kirkby Lonsdale Gas-Works to the Local Authority, it is understood that Mr. Thomas Newbigging has been appointed Arbitrator for the Company, and Mr. A. Silverthorne for the District Council. The arbitration will probably take place at the end of this month or the beginning of next.

**The Dangers of Acetylene.**—The current number of the "Ironmonger" records an explosion of acetylene gas which occurred in a café at Nogent-sur-Marne last Sunday week. The accident is worthy of note because of the peculiar circumstances which are alleged to have caused it. It is stated that a servant carelessly turned on a water-tap of a pipe connected with the generator supply, and the sudden inundation of the carbide liberated so large a quantity of gas that an explosion followed. Happily the damage done was of a relatively slight character; but a number of dancers in an adjoining saloon suffered injury by falling glass.

**Attempting to Bring the Shipley Gas Company to Reason.**—At the meeting of the Bradford City Council last Wednesday, the Gas and Electricity Committee reported that a Sub-Committee had approved of the electric fittings which had been fixed in two lamps at Frizinghall in place of fittings previously supplied with gas by the Shipley Gas Company, and had instructed the Electrical Engineer to introduce the new system of lighting in all the lamps at present supplied with gas by the Company to which electric mains are laid. The Mayor (Mr. Thomas Speight) having moved the adoption of the report, Mr. Freeman asked whether the Committee would not take into consideration the desirability of supplying the electric light to the Heaton and Bolton districts at the same price as was charged by the Corporation for gas; and representatives of other districts claimed that they should also be borne in mind. In reply, the Mayor remarked that, advanced though the electrical work of the Corporation was, he feared it was impossible yet to produce electricity which could be sold at the same price as the older illuminant for the ordinary purposes of lighting. Explaining to the Council the object which had been kept in view in carrying forward the cables to Heaton and Frizinghall, he said the Shipley Gas Company had been standing on too high a pedestal for the Corporation to reach them; and the idea was to proceed experimentally with electric extension, with a view to depriving the Company of such revenue "as would bring them to reason." He hoped the Company would see the expediency of charging the ratepayers of Bradford a reasonable price, if not the same price as was charged by the Corporation. The idea was the same with regard to Bradford Moor and Allerton. The members of the Council were so liberal-minded that none of them, he believed, would desire to favour one ward and leave out the rest. The minutes were adopted. Since the meeting of the Council, a letter has been forwarded to the local press, on behalf of the Company, pointing out that the statement made by the Mayor is rather misleading. It appears that, "although 3s. 4d. is the nominal price, a discount of 7d. per 1000 cubic feet is allowed on accounts paid within one month. This reduces the price to 2s. 9d.; and 96 per cent. of the consumers at Heaton avail themselves of the discount."


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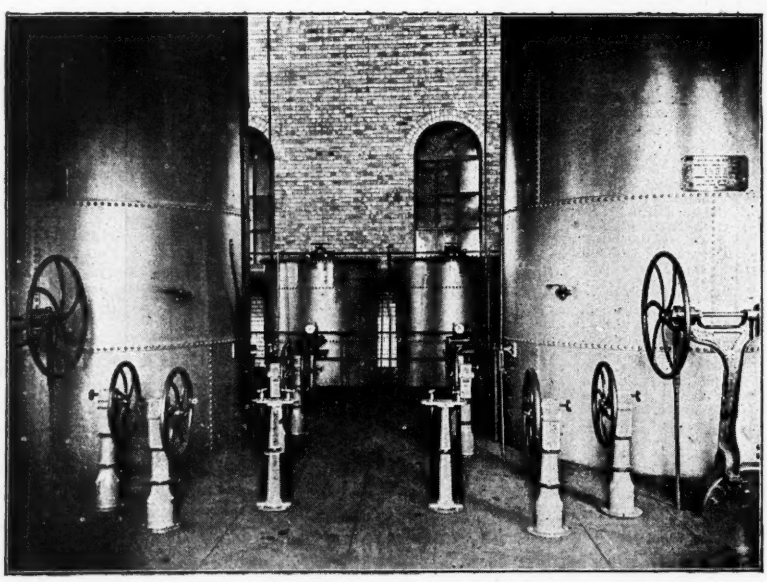

**RESULTS PROVE EFFICIENCY.**

**Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.**

**New Water-Works for Mundesley.**—The Local Government Board have sanctioned the borrowing of £4200 for new water-works at Mundesley; and they will be commenced forthwith.

**The Harrogate Corporation and the Water-Works.**—At the last monthly meeting of the Harrogate Town Council, it was mentioned that a notice had been received from the Harrogate Water Company, claiming as the purchase-money for their undertaking, in respect of ordinary and preference stock, the sum of £235,000; this sum being exclusive of all rights of debenture-holders and mortgagees, and of compensation to officers, &c. The Council had considered the offer; and it being regarded as impossible to pay such an amount, they accepted the alternative to have the price settled by arbitration.

**Projected Extension of the Rhyl Water-Works.**—The Water Engineer of the Rhyl District Council (Mr. L. G. Hall, Assoc.M.Inst.C.E.) recently reported to the Water Committee of that body on the subject of the construction of an additional reservoir, at a cost of £11,000, and, pending its completion, the erection of a temporary pumping-station at Melin Meifod, at an initial outlay of £150, and an annual charge of from £100 to £280 for five or seven years. At the last meeting of the Council, the Committee recommended that steps should be taken to carry out the works; and this was agreed to.

**Fatal Accident at the Warrington Gas-Works.**—Messrs. W. C. Holmes and Co., of Huddersfield, have for some time been engaged in the construction of two new purifiers at the Warrington Gas-Works. Last Tuesday afternoon, while the lid of one of them, weighing about 10 tons, was being lowered into position, the chain supporting it slipped, and allowed it to fall upon two men—George Meredith and Hanson Brayshaw—who were removing the scaffolding underneath, killing them instantaneously. An inquiry into the matter was opened on Friday, by Mr. S. Brighouse; Mr. J. H. Rogers, the District Inspector of Factories, and Mr. F. Taylor, the Secretary of the Corporation Gas Department, being in attendance. Before the proceedings commenced, Mr. F. A. Reed, who represented Messrs. Holmes, expressed their deep regret at the accident, and their sincere sympathy with the relatives of the deceased. According to the evidence of Norman Dawse, who was working with the men at the time of the occurrence, the foreman cautioned them to "be sure and keep away from the sides," in case anything gave way. Witness was knocked down, but not hurt. He went towards the place where deceased were working, and found Brayshaw caught by the neck. Witness got out of the purifier by the hole at the bottom, and found Meredith had been caught across the body and pinned between the edge of the lid and the top of the box. They had no need to go near the side of the purifier to get the planks away. Had witness been at the side, he too would have been killed. In answer to Mr. Reed, witness said that deceased could have heard the foreman tell them to keep away. Mr. Reed remarked that the chain and gearing in use at the time of the accident were not the property of Messrs. Holmes; they belonged either to the Warrington Corporation or to some other contractor on the works. The inquest was adjourned for a week, as the Town Clerk was not present, and as it would be necessary to produce plans.

**Water Scheme for Bedworth.**—Mr. H. B. Nichols, Assoc.M.Inst.C.E., of Birmingham, has prepared a scheme for water-works at Bedworth; and it has been accepted by the Local Government Board. A tank of 60,000 gallons capacity will be erected on a tower about 100 feet from the ground, and will give at all times adequate pressure over all the houses in the town. An abundant supply of excellent water has been found; and its depth in the well is about 50 feet from the surface. The daily requirements for the inhabitants are estimated at 82,500 gallons. This would be 15 gallons per head for a population of 5500; and the yield of the well has been found to be as much as 210,000 gallons in 24 hours. The total cost of the works is reckoned at £9640.

**New Reservoir Scheme for Douglas (Isle of Man).**—The Douglas Town Council last Wednesday had under consideration a report of the Water Committee that it is desirable, in the public interests, that additional water should be provided at the earliest possible opportunity to satisfactorily meet the rapidly increasing requirements of the borough. To do this, the Committee recommended the adoption of a scheme by Mr. G. H. Hill, M.Inst.C.E., to provide a new reservoir in West Baldwin, at an estimated cost of £49,000. It was stated that the water requirements of Douglas have been increasing at the rate of 5 per cent. since 1888. The proposed new reservoir is to store 300 million gallons, compared with 105 million gallons in the new reservoir at Kerrowdhoo, which was the alternative scheme, at a difference in cost of £1500. The Council decided unanimously in favour of the recommendation, and to make application for parliamentary authority to carry out the scheme.

**Completion of the Embankment of the Eccup Reservoir of the Leeds Corporation.**—At a special meeting of the Water Committee of the Leeds Corporation last Wednesday, reports were received from Mr. G. H. Hill, M.Inst.C.E., the Consulting Water Engineer of the Corporation, and Mr. T. Hewson, M.Inst.C.E., the City and Water Engineer, on the subject of the Eccup reservoir. As our readers are aware, this reservoir has been undergoing repair for about nine years. In 1888, it was discovered that the leakage from the reservoir, owing to the defective embankment, amounted to no less than 2 million gallons per day. The Water Committee decided that certain tests should be made, with the object of locating the leakage; and the enormous quantity of 330 bags of cement was deposited in a small fissure 160 feet deep and 4 inches wide, with the object of closing it up. This had no apparent effect upon the leakage; and the Committee determined, upon the recommendation of Mr. Hewson and Mr. Hill, to abandon the tests, and adopt a large scheme for the making of a puddle trench, which has occupied some years in construction. It was found, on getting below the foundation of the embankment, that nothing less than this trench could possibly have stopped the leakage, as there were numerous fissures in the rock through which the water had percolated. These have now all been effectively closed, and the reservoir is to be again brought into use. Though the work has involved an outlay, to date, of upwards of £150,000, the Committee believe the money has been well spent, inasmuch as it has placed at their disposal a greatly improved means of supplying the city and the district with water.

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CATHEDRAL GLASS LIGHTING DOOR.

RUBY GLASS PANEL IN BODY.

STUDDED CAST-IRON HEAT DEFLECTOR.

NO FLUE NEEDED.

**Position of the Liverpool Corporation Water Department.**—Presiding at the last meeting of the Liverpool Corporation Water Committee for the present municipal year, Mr. W. J. Burgess, the Deputy-Chairman, said he thought the Committee might fairly congratulate themselves on the position of the undertaking. The number of people supplied with water had grown wonderfully; and the quantity of water delivered had increased by 270 million gallons during the year. A large proportion of the increase was due to the great quantity required for trade purposes, which indicated to some extent the prosperity of certain industries in Liverpool. The increase in the water used for trade purposes was 62 millions, or one-fourth of the total. The new consumers had increased from 2114 to 2395, while the total number was 160,000. During the year certain new works had been opened; and the scheme laid down by the Engineer in 1893 had now been completed by the opening in March of the Breeze Hill service reservoir, and in July of the Aubrey Street engine, which bore the name of their esteemed Chairman, Alderman Radcliffe. In conclusion, Mr. Burgess referred to the great amount of work accomplished by the officials of the Water Department, especially by Mr. Parry, the Water Engineer.

**Stockton and Middlesbrough Water Board's Accounts.**—The accounts of the above Board for the half year ending Feb. 14 last have been issued. They show that the capital expenditure was £15,955; making the total outlay on the undertaking at that date £1,803,391. Nothing was received on capital account during the half year; the total amount to date being £1,791,170, or £12,221 less than the amount expended. The revenue account shows the income to have been £36,537; being an increase of £1570, as compared with the preceding half year, and an increase of £2870, as compared with the half year ending Feb. 14, 1896. The expenditure on revenue account was £8139; being an increase of £35 on the preceding half year, and a decrease of £202 as compared with the half year ending Feb. 14, 1896. The balance carried to net revenue account is £28,397, as against £26,862 in the previous half year, and £25,324 in the half year ending Feb. 14, 1896. The net revenue account is debited with an allowance to the Railway Company, and several payments for interest, and is credited with the interest allowed by the bank. After being dealt with in this manner, there remains a balance of £31,115, including the sum of £11,073 brought forward from the previous half year. Of this amount, £12,000 was paid to the Corporations during the six months; leaving £19,115 to be carried forward, which has since been paid to the Corporations.

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The Economical Gas Apparatus Construction Company, Limited, the owners of the Merrifield-Westcott-Pearson patents, have recently received an order from the Halifax Corporation to supply them, subject to the supervision of their Gas Engineer (Mr. T. Holgate, Assoc.M.Inst.C.E.), with one set of carburetted water-gas apparatus, having a guaranteed capacity of 1 million cubic feet per 24 hours. In addition to this, they are to furnish two oil-storage tanks and other parts of the plant. The building and the plant are designed for a future extension to 3 million cubic feet if desirable.

The Municipal Authorites of Vienna are inviting tenders until the 26th inst. for the supply of 62,000 wet gas-meters and several thousand dry ones.

A new gasholder, of 60,000 cubic feet capacity—exactly double that of the old one—has just been completed for the Newport (Fife) Gas Company, by Messrs. H. Balfour and Co., of Leven.

Messrs. C. Wilson and Sons have been awarded a silver and a bronze medal, diplomas, and an honourable mention for their exhibit of gas cooking and heating stoves at the Brussels International Exhibition.

The Anglo-Caucasian Oil Company, Limited, of Manchester, have secured the contract for the supply of Russian solar distillate to the Gas Committee of the Birmingham Corporation. This contract has necessitated an arrangement with the London and North-Western and Midland railways to run special oil-trains from their works at Eccles to the Windsor Street and Saltley gas-works at Birmingham.

Messrs. C. Isler and Co., of Southwark, have for some time past been engaged at Ashford (Kent) in boring an artesian well near the South-Eastern Railway for a firm of brewers; and at a depth of between 400 and 500 feet they came upon a seam of coal underlying a bed of rock. The coal is of a much duller colour than that taken from the works between Folkestone and Dover; but experiments made show that it burns freely. The discovery, according to expert opinion, indicates that the seam struck at Dover extends to Ashford, and onwards to the boring works recently started at Pluckley.

The current number of "Commerce," of which a copy has been forwarded to us by Messrs. Richmond and Co., Limited, is largely composed of an article, entitled "Richmond's in the Field," descriptive of the Company's now extensive works at Warrington, Stratford, and London. It is illustrated by forty interior and exterior views; and portraits are given of the directors, managers, representatives, lady lecturers, and principal officials of the Company. The production is interesting as showing how the marvellous development of one branch of the great industry of gas supply which has been witnessed of late years has evoked energy and enterprise in the endeavour to keep pace with and further stimulate it, and how successful have been the results.

We learn that the meter manufactured by Frank Wright's Prepayment Gas-Meter Corporation, Limited, a description of which has appeared in our columns, has been adopted by upwards of 170 gas companies. The Wandsworth and Putney Company have now 335 in use; and out of the last 250 supplied, not one has been returned as defective. The Manchester Corporation have 72 in use, and have ordered 60 more. The Canterbury Gas Company have 37 at work; and a further order for 13 was received last week. The Liverpool Gas Company, the Leatherhead Gas Company, and the Bangor Corporation are now using the meters; and they have been adopted by the Dundee, Greenock, and Perth Corporations. It is satisfactory to learn that, out of the numerous orders executed, the defective meters do not number 2 per cent.—good proof of the quality of the workmanship.

JOSEPH AIRD
GREAT-BRIDGE,
STAFFORDSHIRE.

HIGHEST QUALITY
TUBES AND FITTINGS
GAS, STEAM, WATER, GALVANIZED TUBES and FITTINGS in all Sizes.

LARGE SIZED TUBES FOR "COLLIERIES," FITTED WITH JOSEPH AIRD'S PATENT DOUBLY SECURE FLANGED JOINT OR JOSEPH AIRD'S PATENT "EXPRESS" LOCK-JOINT.
TUBES MADE LAPWELDED ALL SIZES TO TWELVE INCHES.

Illustrated Price Lists on Application.

LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

# GWYNNE & BEALE'S

## PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams:
"GWYNNEGRAM, LONDON."

Telephone No. 65,095. Holborn.

# GWYNNE & CO.,

**HYDRAULIC AND GAS ENGINEERS,**

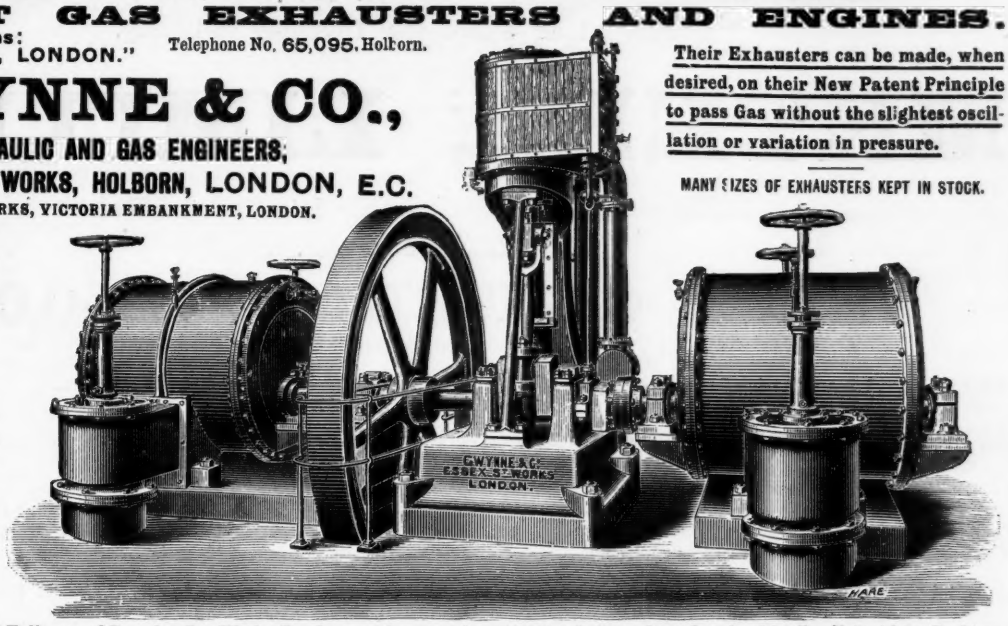
**BROOKE STREET WORKS, HOLBORN, LONDON, E.C.**

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

**They have completed Exhausters to the extent of 35,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.**

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

**Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.**




**Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.**

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

**Catalogues and Testimonials sent on application.**


**NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.**


GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

**OXIDE OF IRON.**

**O'NEILL'S Oxide has a larger annual** sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
JOHN WM. O'NEILL, Managing Director, Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to be addressed to Palmerston Buildings.

**WINKELMANN'S "VOLCANIC"** CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works.
ANDREW STEPHENSON,
182, GRESHAM HOUSE,
OLD BROAD STREET,
LONDON, E.C.
*Telegrams: "Volcanism, London."*

**AMMONIACAL LIQUOR wanted.**
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

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BROTHERTON AND CO., Chemical Manufacturers.
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Offices: Commercial Buildings, LEEDS.
Correspondence invited.

**TUBES for Gas, Steam, and Water** (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

**HUTCHINSON BROTHERS, Gas** Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. III., last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

TO GAS AND WATER OFFICIALS.
**DON'T forget to Order your 1898 Cycle** from the MELROSE CYCLE COMPANY, COVENTRY.

**J. & J. BRADDOCK, Globe Meter Works,** Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

**JOHN NICHOLSON & SONS, Limited,** Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

**PORTER & CO., Gowts Bridge Works,** LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Oct. 5, p. 758.]

**SADLER & CO., Ld., Middlesbrough;** ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
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NEW GAS PLANT CEMENT.

**JOHN E. WILLIAMS AND CO.,**
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

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**INCREASE the efficiency of your** PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY AND SON, Phœnix Iron-Works, LEWES.

SULPHATE OF AMMONIA SATURATORS.

**WALTER THOMASON and SONS,** Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

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OXIDE OF IRON BOG ORE.

**BALE & CO.'S Oxide of uniform quality.** SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
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Telegrams: "BOGORE, LONDON."

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Before placing Orders, please write for Estimate.

PATENTS FOR INVENTIONS.

**J. C. CHAPMAN, M.I.M.E., and Fel.** Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

**BLUE PRINTS of all kinds in any** weather. Drawings and Tracings promptly executed.
J. L. FEATHERSTONE, 21, Old Queen Street, WESTMINSTER, S.W.

IMPORTANT.

**OLD Retorts made equal to new by** repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

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**JOHN ROMANS & SON, EDINBURGH,** Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

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Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

**The SUBSCRIPTION LIST will OPEN on Tuesday, the 19th day of October, 1897, and CLOSE on or before the Thursday following.**

# METERS, LIMITED.

*(Incorporated under the Companies Acts, 1862 to 1893.)*

## SHARE CAPITAL - - £350,000.

DIVIDED INTO

| | |
|---|---|
| 150,000 5½ per cent. Cumulative Preference Shares of £1 each .. .. .. .. | £150,000 |
| AND | |
| 200,000 Ordinary Shares of £1 each .. .. .. .. .. .. .. .. | 200,000 |
| | £350,000 |

The Cumulative Preference Shares are entitled to a Preference Dividend of 5½ per cent. per annum, and rank as regards Capital in priority to the Ordinary Shares.

**Issue of £150,000 4½ per cent. First Mortgage Debenture Stock,** Redeemable, at the option of the Company, at £108, on giving Six Months' Notice. The Debenture Stock will be registered in the books of the Company; and the Interest will be payable Half Yearly on the 1st day of April and the 1st day of October in each Year.

The Debenture Stock and the Interest thereon will be secured by a First Mortgage to the Trustees for the Debenture Stock Holders of the Properties now purchased by the Company, and by a first floating charge (subject to a power reserved to charge further issues on hereditaments subsequently acquired) on all the other Assets present and future (but not including uncalled Capital) of the Company.

The Union Bank of Manchester, Limited, their Branches, and their London Agents, Messrs. Glyn, Mills, Currie, and Co., 67, Lombard Street, E.C., are authorized to receive Subscriptions for the above-mentioned First Mortgage Debenture Stock, Preference Shares, and Ordinary Shares, payable as follows:—

| Debenture Stock. | Preference and Ordinary Shares. |
|---|---|
| £10 per cent. on Application. | 2s. 6d. on Application. |
| £40 per cent. on Allotment. | 7 6 on Allotment. |
| £50 per cent. two months after Allotment. | 10 0 two months after Allotment. |
| £100 | £1 0s. 0d. |

Payment in full may be made on allotment, and, as regards the Debenture Stock, at a discount of 2 per cent. per annum.

**TRUSTEES FOR DEBENTURE STOCK HOLDERS:**

JOSEPH BRADDOCK (J. & J. Braddock), Oldham.
WALTER M. MUSGRAVE (John Musgrave & Sons, Limited), Bolton.

**SOLICITOR TO THE TRUSTEES FOR THE DEBENTURE STOCK HOLDERS:**

JAMES CARLILE, 5, Clegg Street, Oldham.

**DIRECTORS:**

G. H. BRADDOCK (J. & J. Braddock), Oldham.
F. H. ORME (George Orme & Co.), Oldham.
ALDERMAN JOHN MILES, J.P. (Chairman, Bolton Corporation Gas Committee), Bolton.
JOSEPH NASMITH, M.Inst.Mech.E., Manchester.
H. J. DAVIS (Director of the Davis Gas-Stove Company, Limited), London.
ALDERMAN WILLIAM JACKSON (Chairman of the Gas Committee of the Todmorden Corporation), Todmorden.
EDWARD WILLIAMS, J.P., Bradford, Manchester.

**BANKERS:**

THE UNION BANK OF MANCHESTER, LIMITED, their Branches, and their London Agents, GLYN, MILLS, CURRIE, & Co., 67, Lombard Street, E.C.

**SOLICITORS TO THE COMPANY:**

WALKER & ROWE, 8, Bucklersbury, London, E.C.
J. R. KNOTT, 103, Union Street, Oldham.

**ADVISING SOLICITOR IN PATENTS:**

E. ROBINSON WALKER, Solicitor, 18, St. Ann's Street, Manchester.

**BROKERS:**

Manchester—M'EWAN & BURGESS, 15, Cross Street.
Liverpool—HOOK & BRADSHAW, 4, York Buildings, Dale Street.
Oldham—JOHN HOOD, 10, Clegg Street. THOMAS WINSTANLEY, 13, Clegg Street.
Glasgow—T. S. CUNNINGHAM & BROWN, 96, Buchanan Street.
Halifax—C. RAMOS APPLEYARD, 3, Harrison Road.
Dublin—VICTOR WM. MANLY, 24, Anglesea Street.
Belfast—WM. F. COATES & Co., 3, Lombard Street.

**AUDITORS:**

BUTCHER, LITTON, & POWNALL, Chartered Accountants, 42, Spring Gardens, Manchester.
JAMES DUFF & WHITHAM, Chartered Accountants, Bradford and Halifax.

**SECRETARY:**

ALBERT MANNING.

**REGISTERED OFFICES:**

LAWRENCE BUILDINGS, MOUNT STREET, MANCHESTER.

## *ABRIDGED PROSPECTUS.*

This Company has been formed to acquire, as going concerns, the whole of the Assets and Undertakings of the following well-known Businesses; all the Buildings, Plant, and Machinery for the manufacture of Wet and Dry Gas-Meters, and Prepayment or "Penny-in-the-Slot" Gas-Meters, Station Meters and Governors, Textile and other Machinery Indicators, and every

description of Brasswork used by Gas and Water Companies and Steam Users generally; also certain Patent Rights for the manufacture of "Penny-in-the-Slot" Gas-Meters:—

1. J. & J. BRADDOCK, Gas-Meter Manufacturers and Brass Founders, Globe Meter Works, Oldham (Established 1861).
2. GEORGE ORME & CO., Gas-Meter Manufacturers and Brass Founders, Atlas Meter Works, Oldham (Established 1863).
3. SAWER & PURVES, Gas-Meter Manufacturers, Nelson Meter Works, Manchester (Established 1869).
4. THE AUTOMATIC GAS-METER (1895) CORPORATION, LIMITED, Rock Meter Works, Manchester (Established 1895).
5. BROWNHILL'S ORIGINAL PATENT FOR AUTOMATIC PREPAYMENT GAS-METERS, and his Patents for Improvements thereon.
6. Braddock's Patents for Improvements in Prepayment Gas-Meters and Station Gas Governors, including Patents in the United Kingdom, France, Germany, United States of America.
7. Orme's Patents for Improvements in Prepayment Gas-Meters, including Patents in the United Kingdom, France, Germany, Belgium, Sweden, Denmark, Canada, and the United States of America.
8. Orme's Patents for Indicators for Textile and other Machinery.
9. Sawer and Purves' Patents for Improvements in Prepayment Gas-Meters in the United Kingdom and the United States of America.
10. Thorpe and Marsh's Patents for Improvements in Automatic Gas-Meters.
11. Haynes' Patents for Improvements in Automatic Gas-Meters, together with the benefit of any royalties accruing from Licences granted in connection with the above-named Patents.

## VALUATIONS.

The Properties, Assets, and Goodwill to be taken over by the Company have been valued by Mr. Richard Hoyle, Valuator, 4, St. Ann's Square, Manchester, and the Patents by Mr. R. J. Urquhart, Patent Agent (Urquhart and Bollé), 57, Barton Arcade, Manchester, on behalf of the Vendors. The Valuation amounts to £449,463 8s. 10d.; and Mr. Hoyle's Valuation has been confirmed by a separate Valuation made, on behalf of the Directors, by Mr. Walter Brierley, Valuator, Manchester and Bury, a copy of whose Certificate is appended. These Certificates may be inspected by Applicants for Shares at the Offices of the Solicitors to the Company.

"*Wilton Chambers*, 10, *St. Ann's Square, Manchester*,
"*Oct.* 12, 1897.

"TO THE DIRECTORS OF METERS, LIMITED.

"Gentlemen,—Pursuant to the instructions in your letter of the 5th inst., I have inspected and valued the Land, Buildings, Fixed and Loose Plant, Moulding Boxes, and Patterns, together with the Stock of finished Goods and work in process on the Premises of the following Firms:—

Messrs. J. & J. Braddock, Globe Meter Works, Oldham;
Messrs. George Orme and Co., Atlas Meter Works, Oldham;
Messrs. Sawer and Purves, Meter Manufacturers, Garratt Street, Galor Street, Bootle Street, and Thomas Street, Manchester; and
The Automatic Gas-Meter Corporation, Limited, Tortworth Street, Manchester;

for the purpose of confirming, or otherwise, the valuation of the same, which was made by Mr. Richard Hoyle, of Manchester.

"I have pleasure in reporting that a careful valuation of the premises enables me to confirm the valuation of the same by Mr. Richard Hoyle before referred to.

"The whole of the businesses are old established, profitable, and expanding businesses in thoroughly sound working order.—Yours truly,

"WALTER BRIERLEY."

The Businesses to be acquired are of an exceptionally sound nature, dealings being principally confined to Gas Companies, Corporations, and Local Authorities, over 700 of which are Customers of the Amalgamated Firms.

This Amalgamation of a number of large Concerns is calculated to result in a considerable Saving in Working Expenses and a corresponding Economy in connection with the purchase of Materials used.

The Board is a strong one. Messrs. Braddock and Orme have for many years taken an active part in the control of their respective Businesses; and the other Directors have long and intimate acquaintance with the Gas Industry. The services of Messrs. G. H. Braddock, R. E. Braddock, T. A. Braddock, R. H. Orme, J. A. Orme, and John H. Purves (one of the Patentees), who has been Manager for Messrs. Sawer & Purves for thirteen years, have been retained. There will therefore be no interruption of the sound, practical policy that has hitherto ensured success.

## PROFITS.

The Books of the various Concerns have been examined by Messrs. Butcher, Litton, and Pownall, Chartered Accountants, Manchester, and James Duff and Whitham, Chartered Accountants, Bradford and Halifax, whose Certificate is as follows:—

"*Sept.* 30, 1897.

"We have examined the books and accounts of Messrs. J. & J. Braddock, Gas-Meter Manufacturers, Oldham, Messrs. George Orme and Co., of Oldham, Messrs. Sawer and Purves, of Manchester, and the Automatic Gas-Meter (1895) Corporation, Limited.

"In the case of Messrs. J. & J. Braddock, we have taken the accounts for the two years ending 31st March, 1897; these being the only two completed years of the present partnership. In the case of Messrs. George Orme and Co., we have taken the accounts for the three years ending March 31, 1897; in the case of Messrs. Sawer and Purves for the three years ending 24th June, 1896, the last date to which the accounts have been made up; and in the case of the Automatic Gas-Meter (1895) Corporation, Limited, for the fourteen months ending 31st December, 1896 (that is, from the formation of the Company).

"Taking the two years' profit of Messrs. J. & J. Braddock and the profit of the Automatic Gas-Meter (1895) Corporation, Limited, for the fourteen months as a fair average for the three years, and in the two other cases taking the profits for the three years, we certify that the net yearly profits of the four businesses to be combined amount to £30,705 11s. 2d.; and that for the last year in question, the net profits amounted to £38,625 10s. 8d. This profit is arrived at after providing for all trade charges and depreciation, but not for partners' salaries or interest on capital.

(Signed) "BUTCHER, LITTON, & POWNALL,
Chartered Accountants, Manchester.
"JAMES DUFF & WHITHAM,
Chartered Accountants, Halifax."

| | | | | | |
|---|---|---|---|---|---|
| It will be seen that the Net Profit of the various Businesses for the last year amounts to . . . . . | | | | £38,625 | 10 8 |
| Interest on the Debenture Stock would absorb. . . . | £6,750 | 0 | 0 | | |
| Dividend on the Preference Shares . . . . . | 8,250 | 0 | 0 | | |
| | | | | 15,000 | 0 0 |
| Leaving a Balance of . . . | | | | £23,625 | 10 8 |

Sufficient to pay a Dividend of 10 per cent. upon the Ordinary Shares, leaving a surplus towards Reserves, Directors' Remuneration, &c.

The Directors are advised that the combination of Brownhill's Patents, Braddock's Patents, Thorpe and Marsh's Patents, Sawer and Purves' Patents, and Orme's Patents, gives them prior rights in Prepayment or "Penny-in-the-Slot" Meters in this Country, and that they hold the Original Patents for Automatic Prepayment Gas-Meters.

The following is an abstract of the report of Mr. E. ROBINSON WALKER, Manchester, Advising Solicitor in Patents:—

"18, *St. Ann's Street, Manchester*,
"*29th September*, 1897.

"Brownhill's patent, in my opinion, indicates, for the first time, a method by which a predetermined volume of gas is delivered after its value has been prepaid—the means used to effect the operation including the use of a coin to release the meter-drum or bellows, and to permit the passage of gas, whilst the pressure of the gas is utilized to cause the re-action of the parts."

The Price to be paid by the Company to the Vendors, Commerce, Limited, for the various Assets, Properties, Patent Rights, &c., has been fixed at £449,463 8s. 10d., payable as to £300,000 in Cash and as to £149,463 8s. 10d. in Cash or Debentures or Shares, or partly in Cash or Debentures or Shares of the new Company at the option of the Directors. This Price includes the Promoters' profits on the resale.

A Sum of £50,000 in Cash will be set aside out of the present issue to augment the Working Capital at present available.

All expenses of promotion (except stamp duty and registration fees) up to and including the first allotment of Shares will be paid out of the purchase consideration and not by the Company.

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**Full Prospectuses, with Forms of Application, may be obtained at the Offices of the Company, or from their Bankers, Brokers, or Solicitors.**

*Manchester, Oct.* 13, 1897.

*Price 2s., Post Free.*

**STEPHEN CARPENTER, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air,** and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.

S. Carpenter, Ryde House, 28, Woodhouse Grove, East Ham, Essex.

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**GAS Companies in Formation, Local** Bodies, &c., desirous of LIGHTING THEIR DISTRICTS, may have VALUABLE INFORMATION by preliminarily consulting the Advertiser.

Address, in first instance, No. 2920, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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**ADVERTISER (Age 45), experienced** Accountant in Municipal and Gas-Works Routine, would be glad to hear of a SITUATION.

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**WANTED, a Situation as Gas-Fitter's** MATE. Used to Main and Service Laying and Gas-Works; also slight knowledge of Gas-Fitting. Age 25. Three Years' Reference.

Address 8, College Place, St. Albans, Herts.

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**ADVERTISER (Age 31) requires a** Situation as GAS-FITTER. Well up in Iron and Compo. Pipe Work. Twenty-one Years' good References. Used to General Fitting. No experience in Gas-Works; but no objection.

Address Jas. Jones, 2, Blackstone Street, Canton, Cardiff.

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**GAS Distributing Engineer or District** Superintendent seeks RE-ENGAGEMENT. Experienced Man, capable of taking entire charge of large District—Mains and Services, Gas-Cookers, Gas-Fires, Bath-Heaters, Slot Meters, Incandescent and other Lighting, &c.

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TO GAS ENGINEERS AND MANUFACTURERS.

**GENTLEMAN, with extensive experience** in Gas Engineer's and Manufacturer's Office, and accustomed to Travel, is open to ENGAGEMENT. Could introduce first-class connection among Gas Companies.

Address No. 2926, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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AGENCY.

**A WELL-INTRODUCED Firm in the** gas line in Switzerland, with Travellers covering the whole Country, are prepared to take up the AGENCY of a Manufacturer of Brass Gas-Fittings. First-class References.

Please address, stating Terms, H. 4679 Z, care of Haasenstein and Vogler, Advertising Agents, Zurich.

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**WANTED, for a small Gas-Works, a** STOKER who understands Engine and Exhauster, and would make himself generally useful.

Apply to the Manager, Gas Company, Knighton, Radnorshire.

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**WANTED, good Stokers, used to Shovel** Charging and Engine and Exhauster. Wages 30s. to 35s. per week.

Address No. 2938, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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**WANTED, a steady Man as Main and** SERVICE LAYER, METER INSPECTOR, &c. One who can do Smith's work preferred.

Apply, stating Age and Wages required, to Manager, Gas-Works, Wilmslow, Manchester.

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**WANTED, a thoroughly efficient Main-** LAYER.

Apply, by letter, stating Age, Experience, where now employed, and Wages required, to No. 2937, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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SOUTHBOROUGH DISTRICT COUNCIL.

**WANTED, a competent person to act** as CLERK OF WORKS, to superintend the laying of Gas-Mains. Good References required.

Apply, with full Particulars, stating Wages, &c., to Philip Hanmer, Southborough, Kent.

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**WANTED, a Clerk of Works, who must** be a good Draughtsman, accustomed to superintend the Erection of Gasholders and Extensions, and able to take charge of the Works if required. House, Gas, and Coal provided.

Apply, stating Wages required, Age, and Experience, to No. 2933, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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**WANTED, in South Wales, two Gas** STOKERS. Wages 25s. per week during Summer Months, and 27s. per week during Winter Months. None but very reliable and steady Men need apply.

Further Particulars may be had on applying (by letter only) to No. 2939, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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RICHMOND GAS COMPANY.

**WANTED, a Man for Sulphate Works,**

Apply to the Engineer, Gas-Works, Richmond, Surrey.

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ELLAND-CUM-GREETLAND GAS COMPANY.

**WANTED, immediately, a Collector of** Gas Accounts. Preference given to Candidates having had experience in reading Meters.

Applications, stating Age, Experience, and Wages required (with References only), to the undersigned not later than Friday, the 22nd of October next.

Robert Porter,
Engineer and Secretary.

Gas-Works, Elland.

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**GAS CARBON Wanted, not less than** 4-Ton Loads.

Apply to the Brimington Carbon Company, Sowerby Bridge, Yorks.

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SUTTON AND HOOTON GAS COMPANY, LTD.

**THE above Company desire to purchase** a Set of good second-hand PURIFIERS and a TOWER SCRUBBER, with a capacity of about 4000 Cubic Feet per hour.

Particulars and Prices to Mr. Isaac Carr, Consulting Engineer, Farnworth, Widnes.

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**EVANS' 60-inch Photometer, by Sugg,** FOR SALE.

Address No. 2934, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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**GAS-PUMP for Sale, horizontal, one** Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.

Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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**FOR SALE—A Modern Sulphate of** AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 5000 to 6000 lbs. of Sulphate per day.

For further Particulars, apply to the Brymbo Steel Company, Limited, near Wrexham.

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**GAS PLANT for Sale—I can always offer** NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**

J. F. Blakeley, Gas Engineer, Ravensthorpe, Yorks.

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PATENT FOR SALE.

**THE Inventor of a Retort-Lid Fastening,** which is well spoken of, and has met with a considerable measure of success, is anxious to dispose of his PATENT RIGHTS to a Firm of Manufacturers, or other Capitalists, for a Sum down or by Instalments, as may be agreed.

Full Particulars will be sent on application, by letter, to No. 2927, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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**THE Corporation of Blackpool are prepared** to receive TENDERS for the supply of about 900 yards of 24-inch and 18-inch CAST-IRON MAINS.

Specification and Particulars from the undersigned.

Tenders (endorsed outside) to be sent in by the 23rd of October.

(Signed) John Chew,
Engineer.

Gas Office, Blackpool,
Oct. 12, 1897.

---

COMMUNE OF ST. GILLES-LEZ-BRUXELLES.

TENDERS FOR THE CONSTRUCTION OF GAS-WORKS.

**THE Commune of St. Gilles-lez-Bruxelles** invite TENDERS for the CONSTRUCTION and INSTALLATION of GAS-WORKS capable of producing 212 million cubic feet of Gas per annum.

Ground Plans and Conditions may be obtained, on payment of 6 frs., at the Office of the Special Service, No. 504, Chaussée de Mons, Anderlecht, Brussels.

Tenders must be sent to the Communal Secretary, care of the Burgomaster, St. Gilles-lez-Bruxelles, before Noon on Dec. 31, 1897.

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FIRE-CLAY GOODS.

**THE Directors of the Sheffield United** Gaslight Company invite TENDERS for the supply of FIRE-CLAY GOODS (Retorts, Bricks, &c.) required for Repairs at their Neepsend and Effingham Street Stations during the next Twelve Months.

Specification and Forms of Tender may be had on application to the Company's Engineer, Mr. Fletcher W. Stevenson.

The Directors do not bind themselves to accept the lowest or any tender.

Sealed tenders, marked "Tender for Fire-Clay Goods," addressed to the undersigned must be delivered by post not later than the first post on Saturday, the 30th inst.

Hanbury Thomas,
General Manager and Secretary.

Commercial Street, Sheffield,
Oct. 12, 1897.

---

GAS TAR.

**THE Cork Gas Consumers' Company** invite TENDERS for a quantity of TAR, delivered at the Gas-Works.

J. S. Mahony,
Secretary.

72, South Mall, Cork,
Oct. 15, 1897.

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GLASGOW CORPORATION GAS DEPARTMENT

TENDERS FOR GASHOLDER.

**THE Corporation of Glasgow invite** TENDERS for the construction of a THREE-LIFT GASHOLDER, 216 feet diameter by 145 feet, at their Dawsholm Gas-Works.

Plans may be seen, and Form of Tender and copy of Specification obtained, at the Engineer's Office, 45, John Street, Glasgow, on payment of Two Guineas.

Sealed offers, marked "Tender for Gasholder," to be addressed to the Subscriber, and lodged with him on or before Thursday, the 28th inst., at Ten a.m.

The Corporation do not bind themselves to accept the lowest or any tender.

J. D. Marwick,
Town Clerk.

City Chambers, Glasgow,
Oct. 12, 1897.

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MANCHESTER CORPORATION GAS-WORKS.

TAR.

**THE Gas Committee of the Corporation** of Manchester are prepared to receive TENDERS for the purchase and removal of the whole or a portion of the TAR in stock and to be produced at their Rochdale Road Gas-Works during the period commencing from the 1st day of November, 1897, and ending on the 31st of March, 1899.

The Committee do not bind themselves to accept the highest or any tender.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Tar," must be delivered at the Offices of the Gas Department, Town Hall, on or before Ten a.m., on Thursday, the 28th inst.

Forms of Tender and further Particulars may be obtained on application, in writing, to Mr. Charles Nickson, Superintendent of the Department.

By order of the Gas Committee,
Wm. Henry Talbot,
Town Clerk.

Town Hall, Manchester,
Oct. 15, 1897.

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ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

**MR. ALFRED RICHARDS undertakes** the issuing by Auction of GAS AND WATER SHARES under Parliamentary Power.

He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.

Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.

Offices: 18, Finsbury Circus, E.C.

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## METROPOLITAN WATER COMPANIES,

Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex—showing the Capital, Income, Expenditure, Profits, and Dividends per Million and per Thousand Gallons of Water supplied; the proportion of Expenditure and Profits to Gross Income; and the Income, Expenditure, and Profits per House, &c., supplied for the Year ended Dec. 31, 1896, or March 31, 1897, together with the Quantity of Water supplied, the estimated Daily Quantity supplied for Domestic and other Purposes, the Quantity supplied per Head of Population, &c., &c., for the Year ended Dec. 31, 1893.

**Compiled and arranged by**

**ALFRED LASS, F.C.A.**

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WALTER KING, 11, Bolt Court, Fleet Street, E.C.

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**ITS SOURCE—RELATIONSHIP TO SOIL—EFFECT ON PLANTS.**

By H. H. COUSINS, M.A.,
South-Eastern Agricultural College, Wye.

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"Invaluable to those engaged in lighting or water works."—ENGINEERING.

**Just Published. Twenty-First Year of Issue. Revised and Enlarged.**

# GAS AND ELECTRIC LIGHTING DIRECTORY AND STATISTICS,

With List of Engineers, Managers, and Associations,

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GAS COAL AND CANNEL FACTORS,

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MANUFACTURERS OF
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**Together with the Private and Public Undertakings Grouped—1895 and 1896 Workings.**

COMPILED BY

**W. J. WARNER, of South Shields.**

These Diagrams, which were noticed in the "JOURNAL" for Aug. 24, 1897, may be had of WALTER KING, 11, Bolt Court, FLEET ST., E.C.

**COKE-BREAKERS,**

**PRICES REDUCED.**

**(THOMAS & SOMERVILLE'S PATENT)**

***New Design, with two Cutting Rollers, making less Breeze than their old pattern.***

**GEORGE WALLER & CO.,**

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*And at STROUD, GLOUCESTERSHIRE.*

**THE SILICA FIRE-BRICK COMPANY,**

**OUGHTIBRIDGE, near SHEFFIELD,**

MANUFACTURE

**SILICA BLOCKS, BRICKS, AND CEMENT**

OF SUPERIOR QUALITY

**FOR GAS-FURNACES.**

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

**GREATER DURABILITY,**

Strongly recommended where EXCESSIVE HEATS have to be maintained.

**HOLMSIDE GAS COALS.**

**PRESENT DAILY PRODUCE OVER 4000 TONS.**

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 168 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 108 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

**SOUTH MOOR PELTON GAS COALS.**

**PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.**

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton. . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·18 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

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**Steam, Manufacturing, & Gas Coals & Cannel**

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Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

**NEWBATTLE CANNEL.**

**Highest Results in Gas, & Excellent Coke.**

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*Prices and Analysis on application.*

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**BOGHEAD CANNEL.**

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 36·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

**EAST PONTOP GAS COAL.**

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

**SOUTH PELAW MAIN GAS COAL.**

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

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Coke . . . . . 68 per cent.

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W. RICHARDSON, Fitter.

## BOLDON GAS COALS.

ANALYSIS.

| | | |
|---|---|---|
| Yield of Gas per ton . | 10,500 | Cubic Feet. |
| Illuminating Power . | 16·9 | Candles. |
| Coke . . . . . | 66·7 | Coke. |
| Sulphur . . . . . | 0·86 | Sulphur. |
| Ash . . . . . | 2·04 | Ash. |

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Available output up to 5000 tons per day
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
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## S. J. DITCHFIELD,

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WORKED BY THE

## WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895*,

| | |
|---|---|
| Yield of Gas per Ton . . | 10,500 Cub. Ft. |
| Illuminating Power . . | 16·9 Candles. |
| Coke (of good quality) . . | 67·5 per Cent. |
| Sulphur . . . . . | 0·58 ,, |
| Ash . . . . . | 2·78 ,, |

For Price, &c., apply to the

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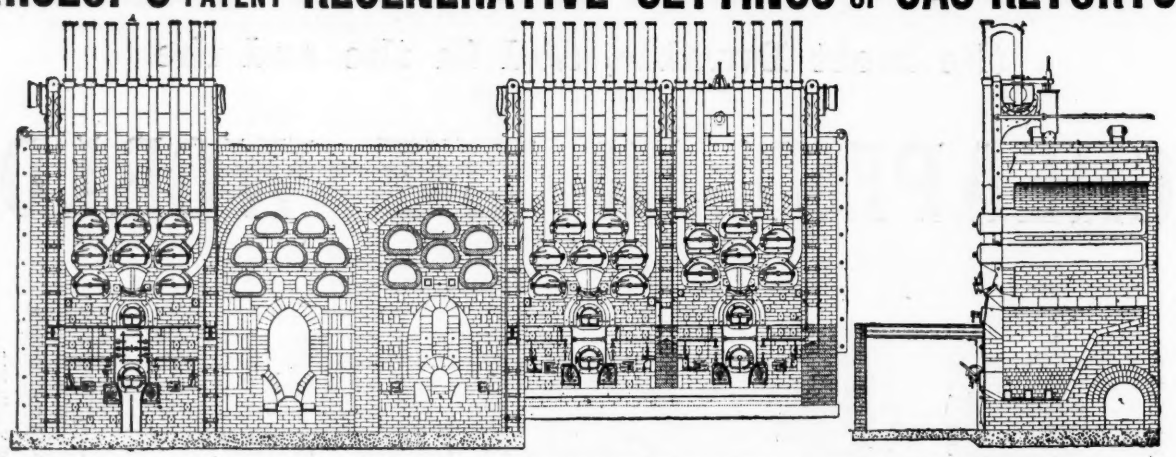
## HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



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THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, Hamilton, Agent for Scotland and Ireland; Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B., and to whom all Inquiries should be addressed in the first instance.

## HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non*

TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

## SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.
*Further Information and Pamphlets from Principal Agent.*

TELEGRAPHIC ADDRESS: "GAS, LEEDS."

CLAYTON, SON, & CO.

LIMITED,

LEEDS,

MAKE

RETORT LIDS

OF ALL FORMS AND SHAPES IN IRON OR STEEL

BY SPECIAL HYDRAULIC MACHINERY.

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PRICES ON APPLICATION.

The Climax of Regenerative Gas Lighting!!

THE

"VERTMARCHE"

A 280-Candle Power

PLAIN IRON LAMP,

CLASS A— 55/-

LIGHT for LIGHT

less than half the price of any other Regenerative Lamp.

Manufactured in England.

HENRY GREENE & SONS,

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PARTICULARS AND PRICES FREE. AGENTS WANTED.

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Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

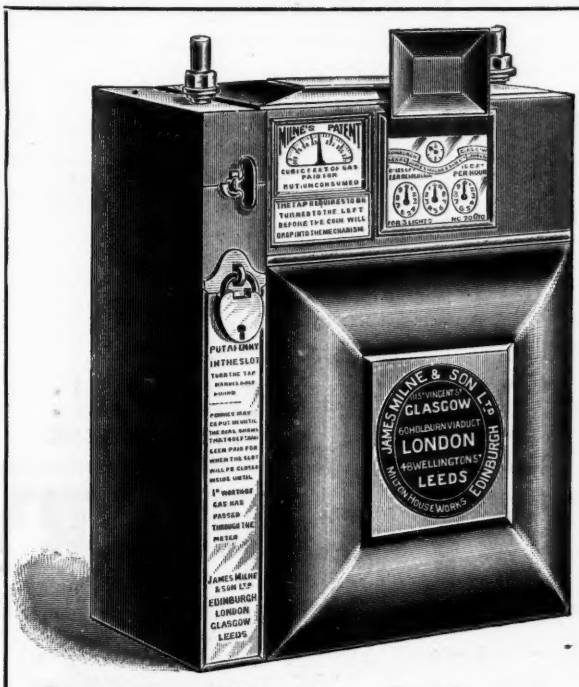
ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."




JAMES MILNE & SON, LTD.,

MILTON HOUSE WORKS,

EDINBURGH.

LONDON. GLASGOW. LEEDS.

MILNE'S PATENT

PREPAYMENT DRY METER.

MOST compact Attachment in the Market.

Same Height as an Ordinary Meter.

Cast-Iron Attachment Cover, with extra large Money-Box, which is withdrawn while opening Door.

Absolutely Positive in Action.

The Whole Mechanism always in Gear.

The following unsolicited comparison has been sent us as showing the exact correspondence of amount due per Index and Cash in Money-Box with these Meters as against those of other Makers:—

| | | | | | |
|---|---|---|---|---|---|
| Milne's | Meter due per | Index | 3/4 | Cash in Box | 3/4 |
| Milne's | ,, | ,, | 4/2 | ,, | 4/2 |
| Milne's | ,, | ,, | 2/6 | ,, | 2/6 |
| Milne's | ,, | ,, | 3/4 | ,, | 3/4 |
| Milne's | ,, | ,, | 2/6 | ,, | 2/6 |
| Two other Makers. | ,, | ,, | 6/8 | ,, | 6/11 |
| | ,, | ,, | 1/8 | ,, | 2/0 |
| | ,, | ,, | 3/9 | ,, | 5/2 |
| | ,, | ,, | 2/6 | ,, | 2/8 |
| | ,, | ,, | 4/7 | ,, | 6/0 |

# W. J. JENKINS & CO., RETFORD.

## COAL UNLOADING

## AND

## CONVEYING MACHINERY.

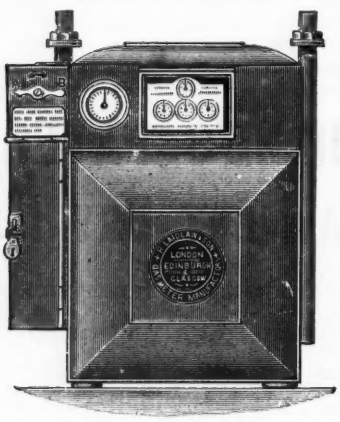
# R. LAIDLAW & SON

## GAS & WATER ENGINEERS.

**MANUFACTURERS OF WET & DRY GAS-METERS,**

SIEMENS WATER-METERS,

PREPAYMENT GAS-METERS.



—DRY METER.—

—WET METER.—

**EDINBURGH:** SIMON SQUARE WORKS. | **GLASGOW:** ALLIANCE FOUNDRY. | **LONDON:** 6, LITTLE BUSH LANE.

# MOBBERLEY & PERRY

**STOURBRIDGE.**

Manufacture & supply best quality of

**Gas Retorts** (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.

*EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.*

London Agents: Contractors for the erection of Retort-Benches complete.

**BALE & HARDY,** Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

**NEW TO THE WORLD.**

**Revolution in Gas Heating!**

# THE ODOURLESS GAS-STOVE

**("OMEGA" PATENT)**

Perfect Combustion, pure Moist Air, no Smell, no Flue, no Water.
Polished Copper, 70s. Cost of Gas ¼d. per hour. Height 24-in.

*Send for full Particulars to—*

## D. HULETT & CO., LIMITED,

**55, HIGH HOLBORN, W.C.**

Wholesale Agents for Middlesex, Surrey, Kent, and Sussex.

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# COLUMNLESS GASHOLDERS

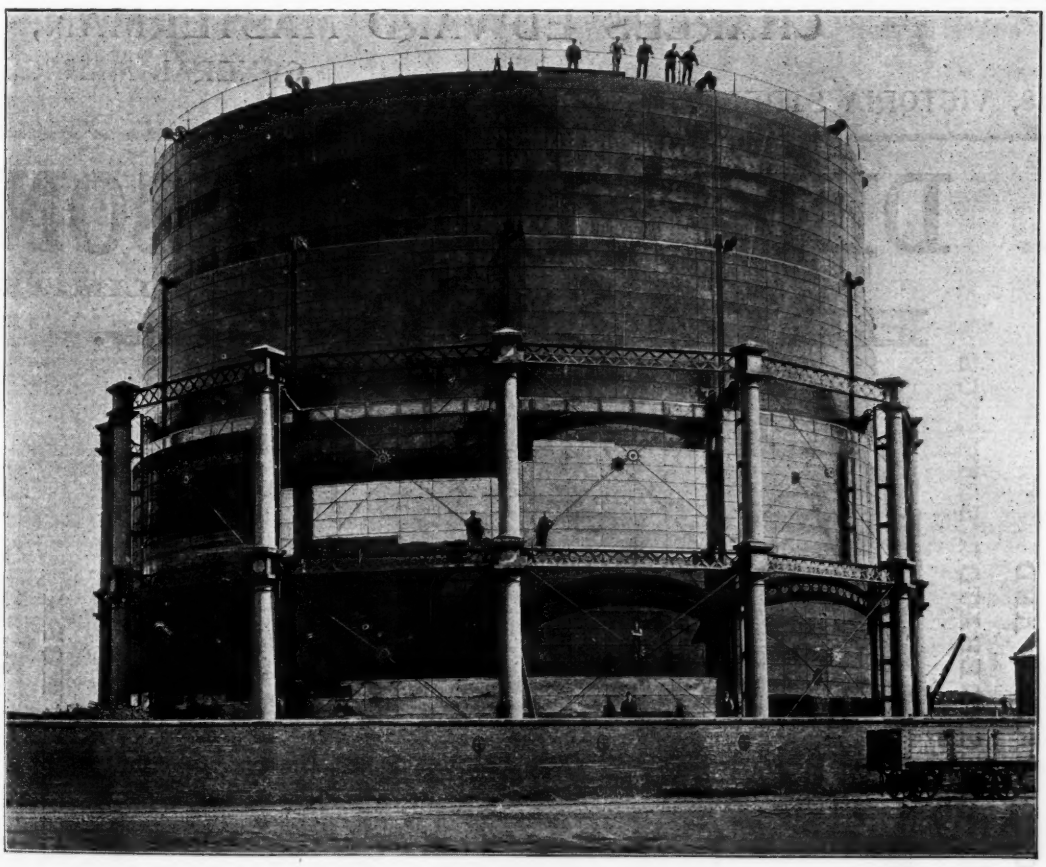
ON

## PEASE'S STEEL CABLE SYSTEM.

**Great Saving in Cost, and Absolutely Reliable in Working.**

These Holders are certified by users to be STEADIER UNDER WIND PRESSURE than Holders with Columns.

INSPECTION INVITED. GREAT SAVING IN WEIGHT; FREIGHTS REDUCED.



FOUR-LIFT GASHOLDER, 120 Feet Diameter, 90 Feet High. TWO LIFTS ADDED ON STEEL CABLES (PEASE'S SYSTEM).
(CABLES ON THREE LIFTS)
*WALLASEY URBAN DISTRICT COUNCIL.*
*(From a Photograph.)*

Manufacturers and Patentees, Telegrams: "GASHOLDER."

## ASHMORE, BENSON, PEASE, & CO., LIMITED,

**STOCKTON-ON-TEES.**

THE

# DENAYROUZE LIGHT SYNDICATE, LTD.,

BEG to announce that, having made arrangements for the Manufacture of their **BURNERS** in England, they are **NOW ABLE TO SUPPLY THESE IN ANY QUANTITY.**

These Burners (with Mantles specially made for the Syndicate by the Incandescent Gas-Light Company, Ltd., under the Welsbach Patents) are admitted by all Experts to be the **BEST AND MOST ECONOMICAL LIGHTS FOR LARGE AREAS AND PUBLIC STREETS.**

Press Notices and Opinions from all the leading Gas Managers throughout the Kingdom can be seen on applying to

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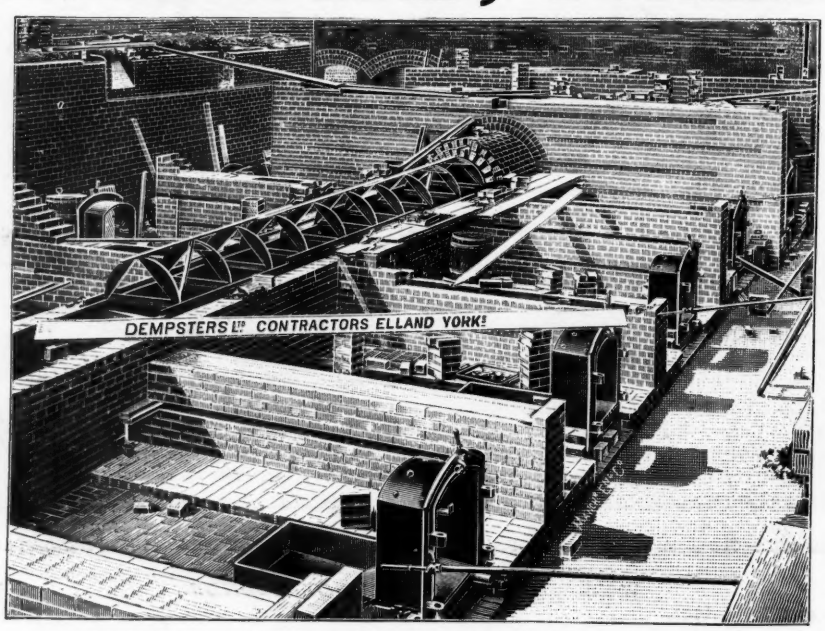
GENERAL MANAGER.

28, VICTORIA STREET, LONDON, S.W.

# R. DEMPSTER & SONS,
LIMITED.

## ELLAND, YORKS.

DIRECT-FIRED GENERATOR AND REGENERATOR SETTINGS




AND RETORT WORK IN ALL ITS BRANCHES.

REGENERATIVE SETTINGS DURING CONSTRUCTION (From a Photo.).

CONTRACTORS FOR COMPLETE INSTALLATIONS ON HORIZONTAL OR INCLINED SYSTEMS WITHOUT SUB-CONTRACTING.

TELEGRAMS: "FIRECLAY," LEEDS. TELEPHONE No. 612.

COAL and COKE Breakers, Elevators, AND Conveyors.

RETORTS, Bricks, Blocks, Tiles, &c.

ENGINEERS IRONFOUNDERS CONTRACTORS MANUFACTURERS

EVERY DESCRIPTION OF

RETORT SETTINGS AND IRONWORK.

WE GUARANTEE RESULTS.

BUILDINGS, ROOFS.

RE-SETTING RETORTS.

We desire to call attention to our SHALLOW REGENERATIVE SETTINGS, which are comparatively inexpensive to erect, and productive of excellent results. They are specially designed to suit those Retort Houses where for various reasons it is undesirable to excavate to any great depth.

We shall be pleased to furnish Designs and Estimates on application.

THE LEEDS FIRECLAY CO. LTD., ENGINEERING DEPARTMENT, WORTLEY, nr. LEEDS.

THE "TRAFALGAR"

PREPAYMENT GAS-METER

FOR PENCE, SHILLINGS, OR ANY COINAGE.

THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
2. Absolute Accuracy.
3. Impossibility of being tampered with.
4. Unaffected by irregularities in shape or thickness of the penny.
5. Can be fixed to any ordinary Wet or Dry Meter.
6. Extra large Money-Box.
7. Price Changer can be altered without otherwise disturbing the Meter.
8. Index showing number of pennies in the mechanism at any time.
9. Rejection of half-pennies certain.

GUARANTEED FOR FIVE YEARS.

FRANK WRIGHT'S PREPAYMENT GAS-METER CORPORATION, Limited,

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Manufacturers of Wet and Dry Gas-Meters.

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Telephone No. 59 Peckham.

## BOWENS' Ltd. Successors,
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MANUFACTURERS OF
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**Established 1860.**

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MANUFACTURERS OF
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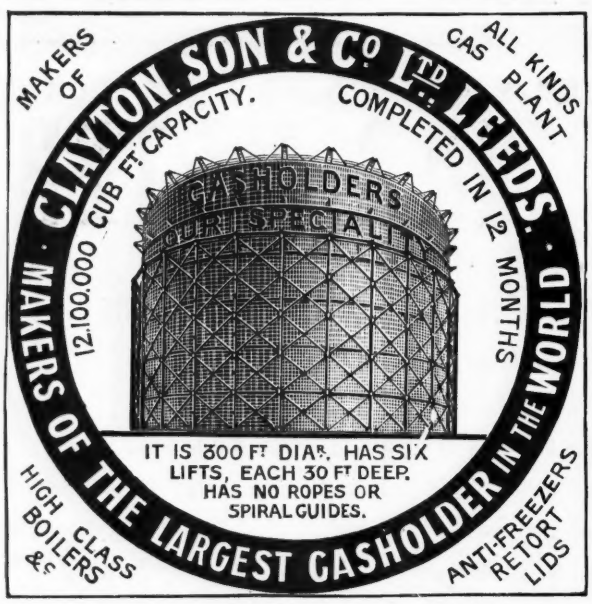
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
*MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.*
ESTABLISHED 1836.

## WILLIAM INGHAM & SONS,
Incorporated with the Leeds Fire-Clay Company, Ltd.,

**WORTLEY FIRE-CLAY WORKS,**
**Near LEEDS,**
Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—
1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
## MACHINE-MADE GAS-RETORTS.


MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
SPECIALITY
IT IS 300 FT DIAS. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

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*Telegraphic Addresses: "GAS, LEEDS," "ECLARAGE, LONDON.*

## ARROL-FOULIS
**Patent Automatic Machinery**
FOR
## DRAWING AND CHARGING GAS-RETORTS.

**Full Particulars may be obtained from the Sole Makers,**
## SIR WILLIAM ARROL & CO., Limited,
**GLASGOW.**
[See Illustrated Advertisement, Oct. 5, p. 766.]

*PETTIGREW'S PATENT*
## Sulphate of Ammonia Plant
ON THE CONTINUOUS SYSTEM
Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
**Old Systems easily and cheaply converted.**
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
**Makers of Self-Emptying Saturators.**
Write for Particulars, Testimonials, and References to
## GEO. PETTIGREW & Co.,
**GAS AND CHEMICAL ENGINEERS,**
*MIDDLESBROUGH-ON-TEES.*

## PATENT TWISTED TAPER RYMERS & TAPS.

These **Patent Twisted Taper Rymers and Taps** are the best ever made for Gas and Water Service Connections. A true Hole and a correct Thread can be assured. They are easy to work, and will last much longer than straight grooved Taps and Rymers.

**THOUSANDS ARE IN DAILY USE.**

**Also SCREWING-MACHINES, STOCKS and DIES (with Patent Twisted Dies), PIPE-TONGS, and other TOOLS.**

**Apply for Prices and Particulars to**
## JOHN RUSCOE,
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## H. KIRKHAM & CO.

Are now prepared to Tender for **SCRUBBER-WASHERS** fitted with their Patent Basket or Cage, with Improved Washing Surface. It is acknowledged to be the **MOST EFFECTIVE MACHINE** for extracting Ammonia and other Impurities from Coal Gas. It is guaranteed to Purify 20 per cent. more Gas in the same space, and at considerably less cost per Machine. The Baskets and Scrubbing Surface can be readily applied to all the sizes of the Kirkham, Hulett, and Chandler Machines now in use.

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# OXIDE OF IRON.

NATURAL BOG ORE FROM OWN MINES.

Samples and Prices on application.

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WORTLEY, LEEDS.

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Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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# GODDARD, MASSEY, & WARNER'S

IMPROVED

## Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

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## GODDARD, MASSEY, & WARNER,

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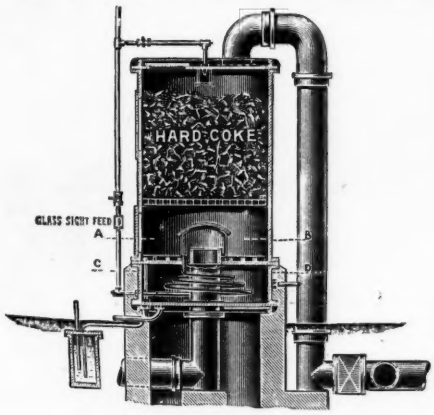
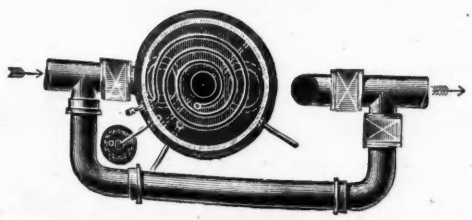
Telegraphic Address: "SCRUBBER, MANCHESTER." National Telephone Nos. 54 and 2296.

## NEWTON HEATH, MANCHESTER.



Sole Makers of

## CRIPPS' PATENT

# CARBURETTOR

FOR ENRICHING COAL GAS, AND FOR

DISSOLVING AND PREVENTING NAPHTHALENE DEPOSITS

IN GAS-MAINS.

PRICES ON APPLICATION.

London Office: 181, Gresham House, Old Broad Street, E.C.

# PARKINSON'S New Patent
# "DRAW-PLATE" GAS-FIRES.

**Absolutely no Smell when first lit. Invaluable for use in Bedrooms. Specially adapted for Invalids and Bronchitis Patients. Creates Draught, and ensures Pure Air.**

THIS improvement is an adaptation of the old-fashioned Draw-Plate used in Coal-Fires. A light Cast-Iron Plate is placed behind the canopy, and is so arranged that, if desired, it may be drawn down before the Fire is lit. A good draught is thus created; and, in two or three minutes, the plate may be raised again. There are no close fitting Parts, Hinges, or Screws to manipulate; and if not required, the Draw-Plate need not be used. In the summer months, the Plate may be drawn down like a Shutter, improving the appearance of the Stove when not in use, and protecting the Fuel from Dust.

**This new and important improvement has been fitted to Four of our well-known Gas-Fires—viz.,**

**The No. 2 "PARKINSON," Nos. 6 and 8 "TREASURE," and No. 4 "DOMESTIC;"**

**Also to a NEW PATTERN for this Season,**

## The "CRYSTAL."

"DRAW-PLATE" UP.

"DRAW-PLATE" DOWN.

**SPECIAL POINTS.**

Parkinson's Patent Draw-Plate as described.
Art Tiles fitted at Sides and Top. Massive and bold Design.
Circulating Burner, which does not "light back," and produces a steady regular Flame.
Open Canopy and special Air-Heating Arrangement, producing a good Circulation of Pure Warm Air.

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BELL BARN ROAD WORKS, BIRMINGHAM.


[See also Advt., p. 836.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Oct. 19, 1897.